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The Status of the NAFO Divisions 4VWX + Subarea 5 Pollock Resource During 1970-1986 with Yield Projected to 1988

by

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Abstract

In 1986 landings again rose substantially with the catch of 68,074 t exceeding the previous historical maximum. During 1985 and 1986 Canadian catches have been stable, with the USA fishery accounting for most of the increase. The fishery's regulations and industry related changes are described since 1970. Despite redistribution of allocations, both the fixed gear and mobile gear <65 ft have overrun their quotas during 1985 and 1986. Several strong and average year-classes appear to exist in the population currently being exploited and commercial catch rates have doubled over the 1985 value. Survey catch rates, although variable, have also shown increases in recent years. This assessment is generally more optimistic than last year's, consistent with an increase in both catch and catch rate. Assessment results calibrated with both commercial and survey catch rates provide a 1986 fully recruited fishing mortality of .375 compared to F_t = .55 in 1985. Given that the 1986 fishing mortality rate of .375 continues for 1987, the $F_{0.1}$ catch in 1988 will be 42,200 t; considerably higher than the $F_{0.1}$ catch of 30,000 t given in 1986 assessment.

Résumé

En 1986, les débarquements ont à nouveau considérablement augmenté; les prises se sont élevées à 68 074 t, un niveau encore jamais atteint. En 1985 et 1986, les prises des pêcheurs canadiens ont été stables; l'augmentation est en grande partie due aux pêcheurs américains. Les modifications apportées au règlement sur les pêches et les changements adoptés par l'industrie sont décrits depuis 1970. Malgré une redistribution des allocations, les bateaux de moins de 65 pi pêchant au moyen d'engins fixes et d'engins mobiles ont dépassé leurs contingents en 1985 et 1986. Il semble exister plusieurs classes d'âge fortes et moyennes au sein de la population qui est présentement exploitée et les taux de prises commerciales ont doublé ces dernières années. Les taux de prises obtenus lors des relevés, bien que variables, ont eux aussi augmenté au cours des dernières années. Cette évaluation est en générale plus optimiste que celle de l'année dernière, compte tenu de l'augementation des prises et du taux de prises. Les résultats de l'évaluation étalonnés avec les taux de prises commerciales et des relevés donnent un taux de mortalité par pêche du poisson entièrement recruté de ,375, comparativement à F_t=,55 en 1985. En supposant que le taux de mortalité par pêche de ,375 se maintienne en 1987, le niveau $F_{0,1}$ sera de 42 200 t en 1988, ce qui est passablement plus élevé que le niveau $F_{0,1}$ de 30 000 t établi dans l'évaluation de 1986.

Introduction

Sequential population analysis (SPA) has been used to estimate the size of the pollock population since 1977. In recent years these analyses have generally been calibrated using Canadian commercial catch rates. In this year's assessment both the commercial catch rate series and the Canadian summer survey catch rates were used to tune the SPA.

In addition, although not used in the assessment, age structured calibrations were also investigated using catch rates at age produced from the commercial catch rates. This compared well with the conventional analysis although indicating higher fishing mortalities on the younger age groups.

Stock sizes for 1970-1986 are given as are yield prospects to 1988 under both $F_{0.1}$ and the 50% rule.

Description of the Fishery

Trends in Reported Landings

Since 1960, Canada and the USA have been the major participants in the pollock fishery and have consistently accounted for the largest share of the landings. Distant water fleet (DWF) catches of pollock have been primarily incidental with the major share taken by USSR trawlers fisning for silver hake and other groundfish on the central and southern Scotian Shelf. Since the extension of jurisdiction in 1977 catches by DWF vessels have generally averaged less than 1000 t annually. Pollock catches since 1980 which have generally exceeded 50,000 t are now averaging 65,000 t for 1985 and 1986. The 1986 nominal catch of 68,074 t exceeds the previous historical maximum with the largest increase due to the American fishery (Table 1, Figure 1).

The Canadian fishery has evolved over the past decade from one in which the pollock catch was incidental, to a directed fishery that is prosecuted by large offshore trawlers on the northern and central Scotian Shelf and Georges Bank and to an inshore fishery conducted by smaller vessels using both mobile and fixed gear on the southwestern Scotian Shelf and eastern parts of the Gulf of Maine and Georges Bank. Spatially, most of the catch has been taken in Division 4X and SA5 with a smaller proportion being taken in divisions 4VW (Figure 2). While this is still the case, there has been a shift within the Division 4VW fishery from Division 4W to Division 4V during 1984-1986, with landings increasing from 5000 t in 1984 to 15,000 t in 1986 (Table 2). The temporal trends in the fishery did not change and describe a year round fishery with a bias toward summer and early fall (Table 3). Nominal catches by area, gear, and season (Table 4a) show a marked increase in the 1986 catch by the large trawlers in divisions 4VW and a substantial decrease by the inshore trawler fleet in Division 4X and SA5. Further increases in the 1986 catch by fixed gears in Division 4X and SA5 were also observed. Data for the Canadian fishery up to June 1987 (Table 4b) indicate that pollock catches overall appear to be down compared to last year although much of the fishery takes place in the summer months.

The USA Georges Bank catch was taken primarily in summer and autumn by large trawlers in the Great South Channel area, along the northern edge and on the Northeast Peak, while most of the USA Gulf of Maine catch has been taken by small trawlers and gillnetters in the Jeffreys Ledge region in autumn and winter (Table 3). All gear sectors have exhibited significant increases in landings since 1984 (Table 5). Catches to May 1987 indicate some decrease in landings (pers. comm. R. Mayo). The recreational fishery in the USA was last estimated via interviews in 1985 (Table 6). Since 1980, the fishery has averaged 866 t per year. Except for 1982 and 1983 the mean weight of recreationally caught pollock has been less than 0.5 kg suggesting that most of the catch has been comprised of immature harbour pollock.

Regulations History

A description of the fishery and its regulations are presented in Table 7. Since 1982, the pollock fishery has been regulated by quotas on four gear sectors (1) fixed gear, (2) mobile gear greater than 100 ft, (3) mobile gear 65-100 ft, and (4) mobile gear less than 65 ft. Seasonal quotas and trip limits were introduced in 1986 for the mobile gear under 65 ft in order to extend the fishery to the end of the year. Despite these regulations and some redistribution of allocation, both the fixed gear, and mobile gear under 65 ft overran their quotas.

Recent catches and TAC's (as determined by Canada) are as follows:

Year	1980	1981	1982	1983	1984	1985	1986	1987
TAC	40	54	55	45	53	53	40[1]	43[1]
Nominal Catch	55	59	53	47	51	63[2]	68[2]	
Canada	36	40	38	33	33	43[2]	43[2]	
USA	18	18	14	14	18	19[2]	24[2]	

[1] Canadian Quota not TAC
[2] Provisional

Information from the International Observer Program on Canadian vessels shows several areas (Figure 3) where pollock are consistently found in the fishery throughout the year. The spatial patterns show a shift in the fishery from one where the highest concentrations of catch were made in Division 4X and Division 4W to one in which most of the catch is taken in Division 4V.

Age Composition of the Commercial Catch

Sampling

Sampling for OTB 1, 2 tonnage class 4+ vessels in Division 4X and SA5 and divisions 4VW has been reasonably good since 1970 although a shift in the large trawler fishery from Division 4X and SA5 to divisions 4VW has resulted in a similar shift in sampling. Sampling for gillnetters and smaller

trawlers was almost nonexistent in the early 70's but has improved noticeably since the late 1970s (Table 8). Given the seasonal nature of these fisheries (i.e. summer) and the small number of boats based in divisions 4VW, our ability to obtain good seasonal coverage and reliable estimates of the age composition of the catch is limited. Therefore, while stratification by area (1970-1986) and season (1979-1986) (Table 9) was possible for the large trawlers TC 4+, this type of stratification was not possible for the small trawlers TC 1-3 and the fixed gear vessels.

Catch at Age

Estimates of fish landed and corresponding mean weights at age for the commercial fishery from 1970-1986 were used in the catch-at-age. Age compositions were produced for the 1986 catch by Canada as in previous years (McGlade and Annand 1986) using RV survey length weight regression parameters as indicated (Table 9). The USA 1986 catch at age and weight at age were supplied by NMFS (pers. comm. R. Mayo). Some minor changes were made to the 1970-1986 catch at age taken by countries other than Canada and the USA. The foreign catch matrix now includes only the years 1970-1976. Catches taken after the extension of jurisdiction were assumed to be taken by small mesh gear and so were included with the USSR catches. A new catch at age matrix was produced to include all USSR catches from 1970 as well as foreign catches from 1977. Age composition proportions and mean weights from survey length age weight (LAW) tables are now based on proportions and weights at age from the STRAP system. The ratio of the old catch at age to the new is given in Table 10. The differences observed result from the previous use of LAW tables which are produced using only fish which have been aged, while STRAP uses all fish sampled. The differences in mean weight estimated for various years (i.e. 1970; LAW = 2.88 Kg; STRAP = .79 Kg) were large enough to produce the differences observed in Table 10.

Total catch at age for all countries and catch at age by area (Table 11a, b, c) reveal that the commercial catch has been dominated by age 3-5 fish although in the last two years this has shifted to somewhat older fish as the 1979 year-class and, to a lesser extent, the 1980 year-class moves through the fishery. Weights at age (Table 12a, b, c) fluctuate over time but no consistent trends were evident. Figure 4 gives the average weight and age of fish in the catch over time. The percent catch at age and the percent biomass at age are given in Table 13a and b. Looking at a spatial breakdown of the total catch at age by area (Division 4X and SA5 and divisions 4VW) reveals the 1982 year-class as strong in Division 4X and SA5 while in divisions 4VW the 1979 and 1980 year-classes dominate. Comparing the Canadian and American components of the catch at age (Figure 5) we see that the Canadian catch-at-age is composed of relatively equal numbers of age 4, 5, 6, and 7 year old fish, while 37% of the USA catch-at-age is made up of age 4 fish, the 1982 year-class.

Stock Abundance Trends

Commercial Catch Rates

Commercial catch per unit effort (CPUE) indicies were calculated for Canadian TC 5 stern trawlers using catch and effort data where pollock was recorded as the main species for the trip (Table 14a and Figure 6). Computations were performed on an annual basis for the period June-August, chosen to reflect a period when pollock were thought to be most widely dispersed. This avoids increases in availability due to spawning aggregations which could cause high CPUE indicies independent of stock size. Trip limits, imposed by both government and industry, since 1983, may also have an impact on the catch rate series possibly causing fluctuations unrelated to stock size.

Catch rates on a set by set basis (Table 14b) were calculated from the International Observer Program (IOP) database for 1982-1986. The two series resembled each other very closely with the exception of the 1985 point. Commercial landings data for 1985 were checked for any obvious anomalies but none were found. However, it was noted that the IOP 1985 data point was based on very little catch. The IOP catch rate series is at the moment too short to be used for calibration purposes, but it may become useful as the time series is extended.

Research Surveys

Summer surveys of the Scotian Shelf and the Bay of Fundy have been conducted since 1970 by Canadian research vessels. From 1970 to 1981 the A.T. Cameron conducted the survey, in 1982 the Lady Hammond was the survey vessel, and since 1983 the Alfred Needler has been the survey vessel. During the transition from one vessel to the next in the survey, a series of comparative fishing experiments were conducted. Based on the results of these experiments, pollock catches were found to be the same and hence a conversion factor of 1.0 is appropriate.

Arithmetic mean numbers and weights per standard tow were calculated for the 1970-1987 period (Figures 7a and 7b). The 1987 survey catch rate was the highest observed in the time series while the 6+ numbers, although variable, show an increasing trend since 1970 (Table 15 and Figure 7a). Although the survey does not appear to track year-classes very well, it does give some indication when they are strong. In recent years both the 1979 and the 1982 year-classes showed up strong as 3 year olds in 1982 and 1985, respectively. Detailed information from the Canadian surveys by strata (Table 16 and Figure 8) indicate an overall increase in abundance rather than being due to extremely large catches in one or a few strata. In recent years pollock also appear to be more widespread in their distribution across the Scotian Shelf with the Gully area (Stratum 51), the inshore area of divisions 4VW (Stratum 60), and the offshore area of Subdivision 4Vn (Strata 40 and 41) revealing significant increases in abundance.

Bottom trawl surveys have also been conducted for the USA by the Northeast Fisheries Center (NEFC) in offshore waters of the Gulf of Maine and Georges Bank during autumn and spring since 1963 and 1968 respectively.

Results for pollock reveal a general increase in relative abundance and biomass through the late 70's and early 80's followed by a sharp decline through 1984 (Table 17 and Figure 9). Both Canadian and USA surveys should be investigated in order to develop an index of abundance for the whole stock.

The State of Massachusetts has surveyed the inshore waters of the western Gulf of Maine since 1978. These surveys appear to be particularly useful for monitoring incoming recruitment, given the proximity of the survey region to known Gulf of Maine spawning grounds. Age 1 abundance estimates from the 1980 spring inshore survey identified the strong 1979 year-class and the 1983 survey also indicated the presence of a comparatively strong 1982 year-class (Table 18). Given the limited area covered by the inshore surveys compared to the distribution of the stock as a whole, it is doubtful whether such indicies will accurately reflect trends in adult abundance.

Estimation of Assessment Parameters

Partial Recruitment

Yearly fishing mortalities at age from an initial cohort analysis, using the 1985 PR estimates from McGlade et al. (1986) were examined for trends in time. As was concluded in last year's assessment during the 1979-1985 period the pattern was consistently flat topped, while earlier years' recruitment was dome shaped. Since year-class tracking could be a problem, both an average PR and an annual PR were calculated for the 1979-85 period. The average PR was estimated by assuming fixed full recruitment for ages 7 and above and dividing the F at age by the fully recruited 7+ mean F. The annual PR calculation assumed variable full recruitment and was estimated as the F at age divided by the fully recruited mean F in each year. Averages were calculated for all ages over the 7 years, and the average vector was adjusted so that the fully recruited mean was equal to 1. Age six could also be set to 1 in the average PR calculation (Table 19). Results being virtually identical, the average PR was used as the input PR for the cohort analysis. The resulting PR vectors are given below together with that used for 1985.

Age	2	3	4	5	6	7+
PR85	.051	.304	.619	.838	1.00	1.00
PR86 average	.038	.279	.592	.854	1.00	1.00
PR86 annual	.037	.280	.596	.851	1.00	1.00

Sequential Population Analysis

The catch at ages 2-11 from 1970-1986 was used in the cohort analysis. Estimates of fishing mortality (Table 20) stock size (Table 21) and stock biomass (Table 22) were obtained by sequential population analysis (cohort analysis) of the total catch-at-age matrix assuming a natural mortality rate of .2. The fishable biomass from SPA was calibrated using the OTB 2 (TC5) June-August catch per unit effort (t/hr). The partial recruitment used in

the calculation of the OTB TC 4+ fishable biomass (Table 23) was based on annual PR vectors which allows the age of full recruitment to vary in order to reflect any year-class tracking (Table 24). Linear regression using least squares was used for calibration. Criteria for choosing terminal F were maximizing the correlation coefficient and minimizing the intercept. In last year's assessment fishable biomass was regressed on the commercial catch rate series. This year because there was thought to be more variance associated with the commercial catch rates than with fishable biomass, calibrations were done using the catch rate series as the dependent variable. This resulted in a better distribution of the residuals; no trends were observed, as well as placing the intercept closer to the origin.

Calibrations were carried out for a range of terminal F values in the cohort analysis. A plot of catch rate vs fishable biomass indicated that the 1982 point was an outlier. The model could not account for the change in catchability due to the very large 1979 year-class at age three. Therefore, the 1982 point was excluded from the calibration. The correlation coefficient was highest (0.77) at a terminal F of .35 and the intercept was closest to zero at F = .4 (Table 25a).

The SPA was also calibrated using mean population numbers 6-11 vs survey 6-11 mean catch-per-tow. Because survey estimates for pollock are thought to be more variable than SPA population numbers, it was considered appropriate to do the calibrations using the survey data as the dependent variable. For this calibration the correlation coefficient was highest (0.842) at a terminal F of .40 while a fishing mortality of .35 resulted in an intercept near zero (Table 25b). The two calibration plots F_t= .35 and F_t= .40 are given in Figures 10 and 11. Based on these results, it was concluded that a 1986 terminal F of .375 would be appropriate.

Age Structured Analysis

Although not used in the assessment, age structured calibrations were investigated using catch rates at age produced from the commercial data as well as the IOP data base. The index for the commercial data was calculated for Canadian TC 4-5 stern otter trawlers using catch and effort data where pollock was recorded as the main species for the trip. Computations were performed on an annual basis for two time periods January-April and May-August for both divisions 4VW and Division 4X and SA 5. The catch rates (t/hr) were then converted to numbers/hr at age using the port sampling age length keys specific to gear and time. A relative index for the whole area (divisions 4VWX and SA 5) was produced by normalizing the index to the 1980-1986 mean by age then weighting across years by the gear catch numbers at age.

An index at length was also generated from the IOP database using combined samples on a set by set basis for stern otter trawlers TC 4-5 where pollock was recorded as the main species. The resulting catch rates, (numbers/hr) were converted to catch numbers at age using gear and age specific port sampling age length keys. Due to some culling in the port samples, the younger and older ages may not be representative of the whole

population. Because of the short time series involved, IOP catch rates were not used in the calibrations.

The model for the age structured analysis is as follows:

$$CPUE_{a,yr} = Bo_a + q_a \bar{N}_{a,yr} + \epsilon_{a,yr} \quad ; \quad a = 2 \ldots 11 \; yr = 1970\text{-}1986$$

Where Bo_a = intercept
q_a = catchability
$\bar{N}_{a,yr}$ = mid-year population numbers
$\epsilon_{a,yr}$ = error in estimate of CPUE a year

Age seven was chosen to start the calibrations and was conducted sequentially back through ages six to three. Criterion for chosing the 1986 fishing mortality was minimization of residuals along cohorts of the various age specific regression lines (O'Boyle et al. 1986).

The age structured calibrations compared quite well with that obtained with the conventional analysis resulting in a fully recruited F of .35 at age seven and above, but with higher fishing mortalities on the younger age groups. Since large year-classes are known to be targeted upon from age 3 and older, this may present a more realistic view of levels of fishing mortalities currently being exerted on the pollock stocks. These age structured calibrations are at present a developing technique which will be investigated more thoroughly before being used in the estimation of the pollock stocks.

Assessment Results

Recruitment

The average PR gave a very low population estimate for the 1984 year-class in 1986. Therefore, the 1984 year-class in 1986 was set equal to the geometric mean of the 1970-84 age two population numbers (38,046 x 10^3) requiring a PR of .005 at age 2 in 1986. In last year's assessment, the size of the 1982 and 1983 year-classes was based on an analysis of the stock status matrix, with values of 50 million and 34 million respectively at age 2. The 1982 and 1983 year-classes are now are estimated 53 and 18 million respectively based on partial recruitment.

Because of the substantial change in terminal F values between this year's and last year's assessments (F_{t85} = .550, F_{t86} = .375), a comparison of the 1985 population numbers at age from this assessment and the previous one are given below.

Age	1986 Assessment	1987 Assessment
2	34,000	17,758
3	40,291	43,228
4	11,042	24,808
5	17,212	28,658
6	20,918	27,898
7	3,627	3,597
8	351	823
9	613	1,406
10	896	1,519
11	339	366

The major differences between the two assessments are the estimates of the 1979-81 year-classes. The generally increased abundance in these year-classes in 1986 is due to the low 1985 catch rate which was very influential in last year's assessment. This year's catch rate vs fishable biomass result of F_t = 375 calibration is corroborated by the survey 6-11 calibration. The 1985 2+ biomass is now estimated to be 255 thousand compared to 175 thousand provided last year.

Population Trends

This assessment presents a generally more optimistic view of the pollock resource than the previous one. Stock size and biomass were both at a high in 1984 and are now experiencing a slight decline, although still high relative to the rest of the series. Both have exhibited considerable variability through the time series and much of the variability, since the mid 1970s, results from the recruitment of the strong 1975 and 1979 year-classes, which have supported the fishery since the late 70s. At this point the 1979 and the above average 1980 year-classes are supporting the fishery. Present indications are that the 1982 year-class may also be above average.

Prognosis

Catch projections were run using average weights at age (1984-86) from the commercial fishery and the 1975-85 average PR vector from the population adjusted for age 2 to make the estimate of the 1984 year-class comparable to the geometric mean of 38 million fish. The 1985 and 1986 year-classes at age two were also set to the geometric mean (1970-84) of 38 million fish.

Input data for these projections are as follows:

Age	1987 Beginning Year Numbers	1984-86 Weights at Age	Partial Recruitment
2	38,046	.84	.005
3	28,879	1.23	.279
4	20,555	1.98	.592
5	21,793	2.66	.854
6	10,600	3.39	1.000
7	10,327	4.26	1.000
8	8,899	5.25	1.000
9	975	6.21	1.000
10	274	6.56	1.000
11	529	6.96	1.000

Assuming a constant F (0.375) for 1986 and 1987 and $F_{0.1}$ = .28 for 1988, the $F_{0.1}$ catch in 1988 would be 42,200 t. Alternatively, using the 50% rule F = .350 for 1988, the catch would then be 51,200 t.

The projected catch at age in 1987 and 1988 under both scenarios is given in Table 26. These short term projections based on 1986 stock levels indicate some reduction in both stock biomass and catch in the near future regardless of which level of fishing mortality is applied. The implied fishable biomass in 1986 to 1988 under the assumption that the 1987 F level is kept constant (F = .375) is 239,000, 210,000, and 187,000, respectively. Given the increasing unregulated effort of the USA fishery in SA5, again we see the need for some rationalization of the allocation of pollock resources between Canada and the USA.

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Table 1. Pollock landings (t round fresh) by country for divisions 4VWX and subareas 5 and 6, 1960 - 1986.

Year	Canada	Fed. Rep. Germany	German Dem. Rep.	Japan	Spain	USSR	United Kingdom	U.S.A.	Other	Total
1960	29470	-	-	-	783	-	-	10132	1	40386
1961	26323	-	-	-	982	-	-	10265	1	37571
1962	31721	-	-	-	-	-	-	7391	-	39112
1963	28999	126	-	-	-	906	28	6653	-	36712
1964	30007	208	-	-	-	4603	374	6006	55	41253
1965	27316	71	-	-	1361	2667	11	5303	-	36729
1966	18271	-	-	-	2384	9865	12	3791	-	34323
1967	17567	-	-	-	1779	644	1	3312	14	23317
1968	18062	-	-	-	1128	372	-	3280	7	22849
1969	15968	1188	2195	-	1515	227	-	3943	7	25043
1970	10753	3233	4710	40	532	527	-	3976	-	23771
1971	11757	633	6849	15	912	2216	-	4890	3	27275
1972	18022	475	4816	8	616	3495	4	5729	54	33219
1973	26990	1124	948	1570	3113	3092	-	6303	36	43176
1974	24975	149	2	40	1500	2348	48	8726	14	37802
1975	26548	236	96	-	709	2004	-	9318	124	39035
1976	23568	994	24	-	303	1466	-	10863	390	37608
1977	24654	368	-	1	2	268	-	13056	53	38402
1978	26801	-	-	110	-	502	-	17714	180	45307
1979	29967	7	-	19	-	1025	-	15541	73	46632
1980	35986	-	-	81	-	950	-	18280	131	55428
1981	40270	-	-	15	-	358	-	18171	90	58904
1982	38029	-	-	3	-	297	-	14357	128	52814
1983	32749	-	-	6	-	226	-	13967	283	47231
1984	33465	-	1	1	-	97	-	17903	169	51636
1985	42971*	-	-	18	-	336	-	19196	66	62587
1986	42975*	-	-	51	-	564	-	24348	136	68074

* Data from DFO Statistics Branch, provisional data for countries other than Canada.

Table 2. Pollock landings (t, round fresh) for divisions 4VWX, Subarea 5 and Statistical Area 6, 1960-1986 (1987 data not available).

Year	4V	4W	4X	5Y	5Z	SA6 +5NK	Total 4VW	Total 4X+5+6	Total
1960	1503	8354	20132	6545	3834	18	9857	30529	40386
1961	1864	13167	14321	5017	3177	25	15031	22540	37571
1962	1292	12045	19624	2560	3576	15	13337	25775	39112
1963	674	9152	20645	2168	3947	126	9826	26886	36712
1964	474	12488	19283	1754	7250	4	12962	28291	41253
1965	1205	13134	13390	1933	7065	2	14339	22390	36729
1966	788	11040	12648	953	8846	48	11828	22495	34323
1967	657	5836	8290	1728	6790	16	6493	16824	23317
1968	1013	5954	10656	1416	3806	4	6967	15882	22849
1969	300	3938	10983	4635	5187	-	4238	20805	25043
1970	649	2952	8194	6281	5280	415	3601	20172	23771
1971	531	1802	9739	7016	7238	949	2333	24942	27275
1972	597	3419	16190	6419	6570	24	4016	29203	33219
1973	1004	5871	23225	5202	7853	21	6875	36301	43176
1974	307	4740	20362	6106	6238	49	5047	32755	37802
1975	799	5697	18668	6015	7851	5	6496	32539	39035
1976	1102	3424	19700	6441	6926	15	4526	33082	37608
1977	1347	6082	14700	8278	7925	70	7429	30973	38402
1978	2931	4910	15161	12238	9960	107	7841	37466	45307
1979	4877	4963	18340	9856	8367	229	9840	36792	46632
1980	3893	7511	20485	11388	11903	248	11404	44024	55428
1981	2316	15678	18842	12475	9319	274	17994	40910	58904
1982	2939	9373	21036	9416	9918	132	12312	40502	52814
1983	5491	5787	18137	8458	9242	116	11278	35953	47231
1984	5474	6043	19486	12543	7847	243	11517	40119	51636
1985**	11890	2801	26675	15609	5153	23	14691	47460	62587*
1986**	14945	2998	23119	18882	7377	2	17943	49380	68074*

* includes NK

** Data from DFO Statistics Branch, provisional data for countries other than Canada.

Table 3 . Pollock landings (t round fresh) by season and country for NAFO Divisions 4VWX-5-6.

Canada (Maritimes & Newfoundland)

	4VW				4X+5			
Year	Jan-Apr	May-Aug	Sept-Dec	Total	Jan-Apr	May-Aug	Sept-Dec	Total
1970	1531	258	362	2151	1075	4800	2727	8602
1971	633	181	280	1094	1169	6160	3334	10663
1972	417	236	716	1369	2006	8762	5885	16653
1973	732	377	2314	3423	5190	13185	5192	23567
1974	713	1257	807	2777	1643	11738	8817	22198
1975	1223	1005	1854	4082	1836	9866	10764	22466
1976	425	845	1186	2456	2078	12170	6864	21112
1977	931	1428	4748	7107	6010	5880	5657	17547
1978	3875	2696	510	7081	5835	7484	6401	19720
1979	1406	5477	1927	8810	4558	10023	6576	21157
1980	2493	4301	3633	10427	6353	13188	6018	25559
1981	4056	2437	11055	17548	5792	7170	9760	22722
1982	3030	4082	4774	11886	3096	14664	8383	26143
1983	2029	7099	1644	10772	4879	14212	2886	21977
1984	2288	4744	4217	11249	2820	13900	5496	22216
1985*	3845	4981	5883	14709	6560	15609	6093	28262
1986*	5503	8035	4403	17941	5840	14163	5031	25034

U.S.A.

	4VW					4X+5				
Year	Jan-Apr	May-Aug	Sept-Oct	UK Mon.	Total	Jan-Apr	May-Aug	Sept-Dec	UK Mon.	Total
1970	13	26	-	-	39	1450	530	1942	16	3938
1971	22	-	-	-	22	1806	711	2346	5	4868
1972	32	4	15	-	51	1198	1214	3266	-	5678
1973	7	18	44	-	69	1442	1368	3422	2	6234
1974	6	30	9	-	45	2656	2051	3614	360	8681
1975	14	4	32	-	50	2527	2824	3502	415	9268
1976	76	3	2	2	83	2454	3753	3910	663	10780
1977	2	2	4	-	8	2954	4597	4753	744	13048
1978	5	-	-	-	5	4373	5078	7461	797	17709
1979	-	-	-	-	-	2888	5588	6225	840	15541
1980	-	-	-	-	-	3776	6110	7023	1371	18280
1981	-	-	-	-	-	5120	4915	7864	272	18171
1982	-	-	-	-	-	3257	4288	6624	188	14357
1983	-	-	-	-	-	3105	5752	4956	154	13967
1984	-	-	-	-	-	4632	5092	7900	279	17903
1985**	-	-	-	-	-	7190	4680	7303	23	19196
1986**	-	-	-	-	-	7650	6881	9815	2	24348

* Data from DFO Statistics Branch, provisional for countries other than Canada.

** From NMFS data tapes.

Table 3. (Continued)

Foreign Catches

	4VW					4X+5				
Year	Jan-Apr	May-Aug	Aug-Sept	UK Mon.	Total	Jan-Apr	May-Aug	Sept-Dec	UK Mon.	Total
1970	622	1	311	-	934	1474	47	6059	-	7580
1971	622	8	26	-	656	1299	33	6424	-	7756
1972	443	20	76	44	583	622	21	4747	-	5390
1973	1079	40	1970	-	3089	778	1100	1824	-	3702
1974	170	166	164	-	500	533	481	239	-	1253
1975	407	53	231	-	691	41	86	347	-	474
1976	178	315	160	-	653	4	165	889	-	1058
1977	8	192	15	-	215	3	204	2	-	209
1978	31	153	95	-	279	-	5	6	-	11
1979	22	22	54	-	98	-	-	1	-	1
1980	101	38	1	-	140	-	8	64	-	72
1981	90	-	-	-	90	-	5	10	-	15
1982	23	106	-	-	129	1	-	1	-	2
1983	18	268	-	-	286	-	3	-	-	3
1984	87	83	1	-	171	-	-	-	-	-
1985*	5	70	9	-	84	-	-	-	-	-
1986*	157	10	20	-	187	-	-	-	-	-

Russia

	4VW					4X+5				
Year	Jan-Apr	May-Aug	Sept-Oct	UK Mon.	Total	Jan-Apr	May-Aug	Sept-Dec	UK Mon.	Total
1970	174	247	53	-	474	10	11	32	-	53
1971	160	186	215	-	561	1144	400	111	-	1655
1972	906	1098	9	-	2013	235	1163	84	-	1482
1973	129	165	-	-	294	1743	45	1010	-	2798
1974	194	903	628	-	1725	58	512	53	-	623
1975	471	981	221	-	1673	58	149	124	-	331
1976	555	488	291	-	1334	10	58	64	-	132
1977	17	82	-	-	99	125	44	-	-	169
1978	9	459	8	-	476	-	26	-	-	26
1979	4	928	-	-	932	6	87	-	-	93
1980	122	715	-	-	837	-	113	-	-	113
1981	45	311	-	-	356	2	-	-	-	2
1982	-	297	-	-	297	-	-	-	-	-
1983	16	204	-	-	220	-	6	-	-	6
1984	-	97	-	-	97	-	-	-	-	-
1985*	-	336	-	-	336	-	-	-	-	-
1986*	-	564	-	-	564	-	-	-	-	-

Table 4a.

Nominal catches of pollock in NAFO divisions 4VW and 4X and Subarea 5 for Canadian (Maritimes & Quebec) OTB1, 2 (otter trawls), TC (tonnage class) 4 and over combined. Data for 1987 available to mid-June.

	4VW				4X+5			
Year	Jan-Apr	May-Aug	Sept-Dec	Total	Jan-Apr	May-Aug	Sept-Dec	Total
1970	1521	211	138	1870	689	1865	1581	4135
1971	618	63	208	887	919	3473	2073	6465
1972	409	89	545	1043	1461	5800	4138	11399
1973	706	276	2173	3155	3259	4227	3239	10725
1974	688	1110	628	2426	1057	6350	5954	13371
1975	1222	894	1775	3891	1042	5699	5361	12102
1976	415	735	1080	2230	877	5418	2746	9041
1977	910	1356	4528	6794	4845	1522	2661	9028
1978	3482	2044	373	5899	4676	3365	2405	10446
1979	1331	5008	1710	8049	3414	3246	982	7642
1980	2315	3849	3235	9399	4307	3409	2380	10096
1981	3903	1342	8417	13662	4223	558	4956	9737
1982	2659	3043	4033	9735	1628	3645	3665	8938
1983	1850	6014	1029	8893	2866	2650	396	5912
1984	2080	3091	3550	8721	728	1563	564	2855
1985	3464	3687	4514	11665	580	829	876	2285
1986	4861	6499	3957	15317	1326	939	235	2500
1987	4687	1301	-	5988	2325	739	-	3064

Nominal catches of pollock in NAFO Division 4VW and 4X and Subarea 5 for Canadian (Maritimes and Quebec) OTB1, 2 (otter trawls), TC (tonnage class) 1, 2 and 3 combined. Data for 1987 available to mid-June.

	4VW				4X+5			
Year	Jan-Apr	May-Aug	Sept-Oct	Total	Jan-Apr	May-Aug	Sept-Dec	Total
1970	8	0	0	8	376	2145	484	3005
1971	4	0	0	4	245	1710	718	2673
1972	0	9	1	10	540	2049	902	3491
1973	0	0	2	2	1922	6762	618	9302
1974	0	39	40	79	562	3398	591	4551
1975	0	0	0	0	745	2610	836	4191
1976	0	0	0	0	1039	2844	715	4598
1977	0	2	0	2	896	2224	808	3928
1978	9	23	2	34	955	2187	961	4103
1979	0	8	2	10	869	4043	1170	6082
1980	2	143	19	164	1540	4138	843	6521
1981	32	320	50	402	976	3314	1576	5866
1982	58	220	93	371	730	4861	1751	7342
1983	84	170	25	279	1435	6911	867	9213
1984	116	587	251	954	1791	8445	2994	13230
1985	188	142	86	416	5390	8524	1343	15257
1986	379	804	44	1227	3797	4801	594	9192
1987	492	202	-	694	2717	4916	-	7633

Nominal catches of pollock in NAFO Division 4VW and 4X and Subarea 5 for Canadian (Maritimes & Quebec) gillnets, longlines, and other gears TC 1 to 4 plus combined. Data for 1987 available to mid-June.

	4VW				4X+5			
Year	Jan-Apr	May-Aug	Sept-Dec	Total	Jan-Apr	May-Aug	Sept-Dec	Total
1970	0	46	224	270	10	790	662	1462
1971	0	118	72	190	5	977	543	1525
1972	0	137	170	307	5	913	845	1763
1973	3	101	139	243	9	2196	1335	3540
1974	3	105	139	247	24	1990	2262	4276
1975	1	79	78	158	49	1557	4567	6173
1976	1	108	105	214	162	3908	3403	7473
1977	19	68	203	290	268	2134	2188	4590
1978	308	566	131	1005	204	1914	3029	5147
1979	38	275	209	522	202	2559	4402	7163
1980	43	209	202	454	492	5641	2764	8897
1981	44	735	1988	2767	536	3298	3228	7062
1982	53	778	558	1389	738	5886	2967	9591
1983	66	785	587	1438	554	4649	1623	6826
1984	13	713	396	1122	270	3743	1894	5907
1985	34	519	358	911	590	6256	3874	10720
1986	264	732	403	1399	716	8422	4202	13340
1987	63	15	-	78	537	1088	-	1625

Table 4b. Catches to June by gear for Canada Maritimes from 1982-1987.

	1987	1986	1985	1984	1983	1982
FG	1270	1596	1668	960	1223	619
MG>100'	9848	10131	6328	6059	9207	7497
MG 65'-100'	399	101	138	183	195	53
MG<65'	7561	7817	7976	5478	4145	2293

Percentage of quota taken to June by gear from 1982-1987.

	1987	1986	1985	1984	1983	1982
FG	11	14	16	9	13	6
MG>100'	51	54	29	27	42	33
MG 65'-100'	152	41	51	68	78	11
MG<65'	97	95	97	67	53	29

Table 5. US pollock catches for subareas 3, 5 and 6 and divisions 4VWX.

OTB (TC 2, 3)

	5Y				5Z				4VWX + 3 + 6			
Year	Jan-Apr	May-Aug	Sept-Dec	Total	Jan-Apr	May-Aug	Sept-Dec	Total	Jan-Apr	May-Aug	Sept-Dec	Total
1970	226	107	310	643	243	151	401	795	21	23	72	116
1971	267	95	519	881	332	177	743	1252	10	6	21	37
1972	226	120	1670	2016	426	233	400	1059	1	15	54	70
1973	258	314	1345	1917	395	256	567	1218	19	31	1	51
1974	632	325	1497	2454	506	505	391	1402	36	-	52	88
1975	562	277	847	1686	389	645	573	1607	32	35	52	119
1976	336	581	1058	1975	598	803	862	2263	10	67	-	77
1977	488	551	1036	2075	735	1443	942	3120	2	21	56	79
1978	964	533	1338	2835	859	1383	1255	3497	9	-	5	14
1979	412	488	698	1598	597	1553	1127	3277	-	3	-	3
1980	756	825	1274	2855	889	1847	836	3572	-	-	-	-
1981	981	539	1609	3129	937	1196	592	2725	-	7	8	15
1982	583	784	1237	2604	941	802	1168	2911	28	28	5	61
1983	427	1075	1000	2502	707	1006	536	2249	36	71	16	123
1984	1080	862	1735	3677	955	938	483	2376	35	62	31	128
1985	2716	1234	1522	5472	742	935	423	2100	2	3	18	23
1986	2812	2395	1973	7180	800	908	901	2609	48	26	34	108

OTB (TC 4+)

	5Y				5Z				4VWX + 3 + 6			
Year	Jan-Apr	May-Aug	Sept-Dec	Total	Jan-Apr	May-Aug	Sept-Dec	Total	Jan-Apr	May-Aug	Sept-Dec	Total
1970	200	25	129	354	675	80	625	1380	91	47	134	272
1971	223	16	107	346	906	258	553	1717	94	7	27	128
0972	73	156	158	387	338	295	348	981	142	220	62	424
1973	147	69	257	473	241	263	305	809	361	76	74	511
1974	238	87	322	647	437	334	330	1101	345	193	52	590
1975	375	78	117	570	297	492	505	1294	443	79	100	622
1976	113	177	226	516	635	395	473	1503	240	210	91	541
1977	191	159	233	583	375	663	357	1395	81	58	103	242
1978	484	266	332	1082	495	517	691	1703	92	56	7	155
1979	250	411	360	1021	439	591	704	1734	42	23	50	115
1980	606	396	431	1433	500	801	865	2166	114	45	222	381
1981	232	418	542	1192	1111	606	707	2424	50	16	78	144
1982	329	825	675	1829	830	508	844	2182	102	40	64	206
1983	402	872	694	1968	1133	1124	1131	3388	198	139	69	406
1984	791	374	1311	2476	1020	1448	1309	3777	89	293	51	433
1985	2556	598	1171	4325	465	623	354	1442	46	11	96	153
1986	1785	1138	1179	4102	634	880	889	2403	76	39	14	129

Table 5. Cont.

LL (TC 1-4+) and Other Gears (Combined)

	5Y				5Z				4VWX + 3 + 6			
Year	Jan-Apr	May-Aug	Sept-Dec	Total	Jan-Apr	May-Aug	Sept-Dec	Total	Jan-Apr	May-Aug	Sept-Dec	Total
1970	2	48	25	75	2	36	16	54	-	-	-	-
1971	3	49	56	108	5	57	13	75	-	-	-	-
1972	11	33	18	62	3	32	10	45	-	-	-	-
1973	13	134	71	218	5	56	22	83	-	-	8	8
1974	23	46	44	113	20	55	24	99	-	-	-	-
1975	15	287	41	343	11	38	26	75	-	-	-	-
1976	21	49	14	84	39	29	5	73	-	-	-	-
1977	18	131	40	189	35	36	3	74	-	-	-	-
1978	18	96	5	119	35	157	99	291	-	-	-	-
1979	30	64	-	94	48	278	86	412	-	-	-	-
1980	16	16	241	273	109	106	-	215	-	-	-	-
1981	72	43	86	201	9	56	12	77	-	-	-	-
1982	12	11	7	30	16	29	14	59	-	-	-	-
1983	3	1	-	4	7	54	16	77	-	-	-	-
1984	-	1	-	1	22	24	4	50	-	-	-	-
1985	2	10	2	14	25	11	21	57	-	-	-	-
1986	-	1	23	24	4	8	15	27	-	-	-	-

GN (TC 1-4+)

	5Y				5Z				4VWX + 3 + 6			
Year	Jan-Apr	May-Aug	Sept-Dec	Total	Jan-Apr	May-Aug	Sept-Dec	Total	Jan-Apr	May-Aug	Sept-Dec	Total
1970	4	48	233	285	-	-	-	-	-	-	-	-
1971	2	41	310	353	-	-	-	-	-	-	-	-
1972	18	122	558	698	-	-	-	-	-	-	-	-
1973	16	192	766	974	-	-	60	60	-	-	-	-
1974	426	553	886	1865	-	-	38	38	-	-	-	-
1975	420	910	1283	2613	-	-	-	-	-	-	-	-
1976	541	1444	1192	3177	2	-	2	4	-	-	-	-
1977	1022	1534	1951	4507	6	6	40	52	-	-	-	-
1978	1408	2043	3725	7176	16	29	7	52	-	-	-	-
1979	1066	2056	2704	5826	5	140	339	484	-	-	-	-
1980	628	1674	2905	5207	171	408	261	840	-	-	-	-
1981	1461	1437	3810	6708	185	429	71	685	-	20	-	20
1982	398	1069	2556	4023	44	205	69	318	-	-	-	-
1983	186	1260	1460	2906	24	151	39	214	-	-	-	-
1984	595	944	2758	4297	51	162	224	437	-	-	-	-
1985	504	950	3496	4950	133	312	216	661	-	-	-	-
1986	1318	1104	4515	6937	172	381	272	825	-	-	-	-

Table 6. USA catches of pollock (numbers, total weight, and estimated mean weight in kilograms) as estimated from data collected in USA recreational fishery surveys.

Year	Number (00's)	Weight (tons)	Mean Weight (kg)
1979	3,648 (2,349)	1,021 (658)	0.28
1980	4,446 (1,997)	2,134 (959)	0.48
1981	2,724 (1,602)	1,226 (721)	0.45
1982	1,686 (882)	2,563 (1,341)	1.52
1983	1,314 (590)	2,799 (1,257)	2.13
1984	642 (205)	276 (174)	0.43
1985	2,147 (1,860)	862 (747)	0.40

Numbers in parentheses exclude data for pollock caught and released alive; weights calculated by multiplying numbers caught by mean weight of pollock available for identification in intercept (creel) survey work.

Table 7. Description of the pollock fishery in 4VWX5 and its regulations 1973-1987.

Year	Fleet	Initial Allocation (t)	Final Allocation (t)	Reported Catch (t)	Percent Taken (%)	Dates (Closures (cl) Trip Limits (tl) Bycatch (bc)	Remarks
1973	All vessels 4X & 5	50.0K	50.0K	43.0K	78	---	mixed groundfish fishery 63% Can; 14% USA; 23% DWF
1974	All vessels-Canadian	34.0K	34.0K	-	-	---	Directed fishery
	All vessels-foreign	21.0K	21.0K	-	-		65% Can; 23% USA; 12% DWF
	Total 4VWX+5	55.0K	55.0K	38.0K	69		
1975	All vessels-Canadian	33.5K	33.5K	-	-	---	Directed fishery
	All vessels-foreign	21.5K	21.5K	-	-		67% Can; 23% USA; 10% DWF
	Total 4VWX+5	55.0K	55.0K	39.0K	71		
1976	All vessels-Canadian	33.5K	33.5K	-	-	---	Directed fishery
	All vessels-foreign	21.5K	21.5K	-	-		63% Can; 29% USA; 8% DWF
	Total 4VWX+5	55.0K	55.0K	38.0K	69		
1977	All vessels-Canadian	20.975K	20.975K	-	-	---	200 mile limit imposed
	All vessels-foreign	9.025K	9.025K	-	-		Directed fishery
	Total 4VWX+5	30.0K	30.0K	38.0K	127		65% Can; 34% USA; 1% DWF
1978	All vessels-Canadian	20.975K	20.975K	-	-	---	Directed fishery
	All vessels-foreign	9.025K	9.025K	-	-		60% Can; 40% USA; <1% DWF
	Total 4VWX+5	30.0K	30.0K	45.0K	150		
1979	All vessels-Canadian	22.32K	22.32K	-	-	---	Directed fishery
	All vessels-foreign	7.68K	7.68K	-	-		65% Can; 34% USA; <1% DWF
	Total 4VWX+5	30.0K	30.0K	47.0K	156		Treaty signed*
1980	All vessels-Canadian	22.32K	29.76K	-	-		Directed fishery
	FG	5.0K	4.76K	9.342K	196		65% Can; 34% USA; <1% DWF
	MG<125'	3.81K	9.0K	8.278K	92	cl 18/08-9/10;cl 09/11-31/12	Allocations based on
	MG>125'(1/1-14/10)	11.91K	12.10K	18.375K	115	cl 31/03- ? ;cl 12/07-15/10	treaty 74.4% Can, 24.6%
	MG>125'(15/10-31/12)	1.6K	3.90K			cl 16/11-31/12	Foreign
	All vessels-USA	7.68K	10.24K	18.3K	179		
	All vessels-foreign	-	-	0.2K	-		
	Total 4VWX+5	30.0K	40.0K	55.0K	137		
1981	All vessels-Canadian	29.76K	40.16K	-	-		Directed fishery
	FG	8.76K	9.3K**	9.8K	105		69% Can; 30% USA; <1% DWF
	MG<125'	7.0K	8.5K	7.2K	84		Allocation based on
	MG>125'(1/1-14/10)	10.5K	18.9K	23.8K	106	cl 15/04-15/10	treaty
	MG>125'(15/10-31/12)	3.5K	3.5K				
	Reserve	-	5.0K**				
	All vessels-USA	10.24K	13.84K	18.0K	130		
	All vessels-foreign	-	-	0.5K	-		
	Total 4VWX+5	40.0K	54.0K	59.0K	109		

* Treaty signed 29 March; was not ratified although allocation made accordingly; 74.4% Canada, 25.6% USA.
** Reserve assigned to fixed gear near end of year to give final allocation of 9.3K

Table 7. (Continued)

Year	Fleet	Initial Allocation (t)	Final Allocation (t)	Reported Catch (t)	Percent Taken (%)	Dates (Closures (cl) Trip Limits (tl) Bycatch (bc)	Remarks
1982	All vessels-Canadian	43.0K	43.0K	-	-		Directed fishery
	FG	10.5K	11.5K	10.9K	95		69% Can; 30% USA; <1% DWF
	MG>100'	24.0K	22.0K	19.0K	86		Vessels greater than 65'-
	MG 65'-100'	0.5K	0.5K	0.22K	44		sector management-company
	MG<65'	8.0K	9.0K	8.3K	92	cl 8/10-13/11	quotas
	All vessels-USA	12.0K	12.0K	14.3K	119		
	All vessels-foreign	-	-	0.4K	-		
	Total 4VWX+5	55.0K	55.0K	53.0K	96		
1983	All vessels-Canadian	40.0K	42.0K	-	-		Directed fishery
	FG	9.6K	10.69K	8.2K	77		70% Can; 30% USA; <1% DWF
	MG>100'	22.4K	21.4K	14.8K	69		(Dec) Companies
	MG 65'-100'	0.25K	0.28K	0.23K	82	cl 30/07	discouraged fishing for
	MG<65'	7.75K	9.63K	9.5K	99		pollock because of low
	All vessels-USA	5.0K	10.0K	14.0K	140		market value; 20,000 lb
	All vessels-foreign	-	-	0.5K	-		limit except if sold
	Total 4VWX+5	45.0K	52.0K	47.0K	90		fresh.
1984	All vessels-Canadian	42.4K	42.4K	-	-		Directed fishery
	FG	10.17K	8.97K	7.0K	78		65% Can; 35% USA; <1% DWF
	MG>100'	23.75K	19.45K	12.0K	62		Trip limits set by
	MG 65'-100'	0.27K	0.77K	0.65K	84		companies (IOP) vary from
	MG <65'	8.21K	13.21K	13.8K	104	Ent. Alloc. Pierce Fishery	20,000-200,000 lb
	All vessels-USA	10.6K	10.6K	17.7K	167	cl 17/10;4X cl 22/05-01/06;	
	All vessels-foreign	-	-	0.3K	-	cl 30/06-02/09	
	Total 4VWX+5	53.0K	53.0K	51.0K	96		
1985	All vessels-Canadian	42.4K	42.4K	-	-		Directed fishery
	FG	10.17K	8.37K	11.63K	139	<65' cl 16/11-28/11	70% Can; 30% USA
	MG>100'	23.75K	17.35K	15.8K	91		Trip limits (IOP) imposed
	MG 65'-100'	0.27K	0.47K	0.42K	89		by companies vary from
	MG<65'	8.21K	16.21K	15.14K	93	27/07-20% bc; 13/08-10% bc;	30-125,000 lbs
	All vessels-USA	10.6K	10.6K	19.3K	182	30/08-35% bc; 16/11-10% bc.	
	All vessels-foreign	-	-	0.42K	-		
	Total 4VWX+5	53.0K	53.0K	63.0K	119		
1986	All vessels-Canadian	40.0K	40.0K	-	-		Directed fishery
	FG	11.0K	11.4K	14.4K	126	Class A-03/10-1500kg tl 10%	63% Can; 36% USA;
	MG>100'	20.0K	18.8K	18.1K*	96	bc to 31/12	Trip limits imposed by
	MG 65'-100'	0.25K	0.25K	0.38K	152	cl 13/09	companies 15-100,000 lbs
	MG<65'	8.75K**	9.55K	10.1K	106	28/03-4500kg tl; 8/04-0kg tl	
	All vessels-USA	-	-	24.0K	-	10% bc; 28/04-13600 tl;	
	All vessels-foreign	-	-	8.0K	-	6/05-22500kg tl; 14/06-	
	Total 4VWX+5	40.0K	40.0K	43.0K	108	4500kg tl; 23/06-1500kg tl;	
						18/07-1500kg tl or 10% bc;	
						26/08-0kg tl 10% bc; 1/09-	
						1000kg tl or 10% bc; 20/09-	
						0kg tl 10% bc to 31/12	

* 1.7K Newfoundland 16.2 Scotia Fundy

** Jan-Apr 1.3K; May-Aug 5.65K; Sept-Dec 1.8k - changed mid year - Jan-Apr 2.97K; May-Aug 5.26K; Sept-Dec 1.31K

Table 7. (Continued)

Year	Fleet	Initial Allocation (t)	Final Allocation (t)	Reported Catch (t)	Percent Taken (%)	Dates (closures (cl) Trip Limits (tl) Bycatch (bc)	Remarks
1987	All vessels-Canadian	44.5K	-	-	-		Directed fishery
	FG	11.825K	-	3.862K	33		Can. catches to Aug 5
	MG>100'	21.5K	-	13.514K	63		
	MG 65'-100'	0.27K	-	.426K	158	cl 24/03-31/03	
	MG<65'	9.405K*	-	8.962K	-	1/01-9000kg tl; 20/02-4500kg tl;	
	3PS	1.5K**	-	-	-	12/03-0kg tl 10% bc; 1/05-	
	Total 4VWX+5+3PS	44.5K	-	29.764K	-	9000kg tl; 1/06-7000kg tl;	
	All vessels-USA	-	-	6.808***	-	11/06-4500kg tl; 19/06-1500kg	
	All vessels-foreign	-	-	-	-	tl; 26/06-0kg tl 10% bc.	

* Jan-Apr 2.93K; May-Aug 5.175K; Sept-Dec 1.3K - changed mid year - Jan-Apr 2.0K; May-Aug 5.805K; Sept-Dec 1.6K

** 3PS 1.5K Aug 15-Sept MG<65'

*** USA reported catch to May.

Table 8. Canadian commercial samples available for pollock in divisions 4VW and in Division 4X and SA 5 by gear and season.

4VW

	OTB 4+				OTB TC, 1-3				GN				LL & Others			
Year	Jan-Apr	May-Aug	Sept-Dec	Total	Jan-Apr	May-Aug	Sept-Dec	Total	Jan-Apr	May-Aug	Sept-Dec	Total	Jan-Apr	May-Aug	Sept-Dec	Total
1970	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
1971	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1972	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1973	-	-	7	7	-	-	-	-	-	-	-	-	-	-	-	-
1974	2	-	1	3	-	-	-	-	-	-	-	-	-	-	-	-
1975	2	1	2	5	-	-	-	-	-	-	-	-	-	-	-	-
1976	1	1	5	7	-	-	-	-	-	-	-	-	-	-	-	-
1977	2	6	9	17	-	-	-	-	-	-	-	-	-	-	-	-
1978	8	5	1	14	-	-	-	-	-	-	-	-	-	3	-	3
1979	3	28	1	32	-	-	-	-	-	-	-	-	-	1	-	1
1980	9	3	10	22	-	-	-	-	-	-	-	-	-	1	-	1
1981	8	5	4	17	-	3	-	3	-	2	-	2	-	-	-	-
1982	7	7	4	18	-	-	-	-	-	1	1	2	-	-	-	-
1983	25	13	7	45	-	-	-	-	-	1	2	3	-	-	-	-
1984	12	15	15	42	1	-	3	4	-	2	-	2	-	3	-	3
1985	10	18	14	42	-	-	-	-	-	2	2	4	-	-	-	-
1986	22	20	12	54	-	1	1	2	-	1	1	2	-	2	1	3
1987*	17	17	-	-	3	2	-	5	-	3	-	3	-	-	-	-

4X+5

	OTB 4+				OTB TC, 1-3				GN				LL & Others			
Year	Jan-Apr	May-Aug	Sept-Dec	Total	Jan-Apr	May-Aug	Sept-Dec	Total	Jan-Apr	May-Aug	Sept-Dec	Total	Jan-Apr	May-Aug	Sept-Dec	Total
1970	-	3	2	5	-	1	-	1	-	-	-	-	-	-	-	-
1971	-	4	1	5	-	4	-	4	-	-	-	-	-	-	-	-
1972	1	2	3	6	-	-	1	1	-	-	-	-	-	-	-	-
1973	3	4	4	11	-	1	1	2	-	-	-	-	-	-	-	-
1974	2	6	12	20	3	-	1	4	-	-	-	-	-	-	-	-
1975	3	10	5	18	3	4	-	7	-	-	1	1	-	-	-	-
1976	6	14	9	29	1	2	-	3	-	2	-	2	-	-	-	-
1977	27	6	4	37	1	-	3	4	-	1	-	1	-	-	-	-
1978	16	14	2	32	-	-	-	-	-	3	2	5	-	-	-	-
1979	5	5	1	11	-	2	-	2	-	2	-	2	-	1	-	1
1980	10	6	12	28	1	8	-	9	-	1	1	2	-	-	-	-
1981	4	2	2	8	11	8	5	24	1	3	1	5	1	-	-	1
1982	9	5	11	25	4	14	-	18	1	6	3	10	-	2	-	2
1983	18	12	1	31	9	22	6	37	1	5	3	9	-	5	1	6
1984	6	2	1	9	9	9	10	28	-	3	2	5	-	4	-	4
1985	2	3	2	7	13	9	4	26	2	10	5	17	-	2	-	2
1986	5	3	-	8	13	23	4	40	2	13	3	18	-	12	2	14
1987*	4	13	-	17	14	26	-	40	-	9	-	9	3	6	-	9

* 1987 Samples to August only.

Table 9 Grouping of catch by gears and time period for estimation of removals-at-age. OTB trawls are primarily stern bottom trawls, but there are some side trawls; GN are gillnets, LL are longlines, and others are primarily inshore fisheries.

Year	Period	Tonnage Class	Gears	No. of Samples	Area	Number Aged	Number Measured	Catch (t)	Weight-Length Relationship a	b	Cruise	
1970	April	TC 4+	OTB	1	4VW	55	966	1870	0.01427	2.93733	Cameron 175/176	July 1970
	Jan-Dec	TC 4+	OTB	5	4X+5	178	1348	4135	0.00937	3.07143	Cameron 175/176	July 1970
1971	no samples - 4VW											
	Jan-Dec	TC 4+	OTB	5	4X+5	170	889	6465	0.03004	2.74758	Cameron 188/189	July 1971
1972	no samples - 4VW											
	Jan-Dec	TC4 4+	OTB	6	4X+5	182	1101	11399	0.01871	2.89470	Cameron 201/202	July 1972
1973	Jan-Dec	TC 4+	OTB	7	4VW	276	1564	3155	0.018154	2.88880	Cameron 212/213	July 1973
	Jan-Dec	TC 4+	OTB	11	4X+5	416	2208	10725	0.014285	2.93835	Cameron 212/213	July 1973
1974	Jan-Dec	TC 4+	OTB	3	4VW	136	733	2426	0.01676	2.89081	Cameron 225/226	July 1974
	Jan-Dec	TC 4+	OTB	24	4X+5	762	5470	13371	0.02385	2.80718	Cameron 225/226	July 1974
1975	Jan-Dec	TC 1-6	GN, LL, Other	1	4VWX+5	32	224	6331	0.02286	2.83914	Cameron 236/237	July 1975
	Jan-Dec	TC 4+	OTB	5	4VW	188	1259	3891	0.01676	2.89081	Cameron 236/237	July 1975
	Jan-Dec	TC 4+	OTB	18	4X+5	716	4451	12102	0.02286	2.83914	Cameron 236/237	July 1975
1976	Jan-Dec	TC 1-6	GN, LL, Other	2	4VWX+5	63	445	7687	0.00588	3.13928	Cameron 250/251	July 1976
	Jan-Dec	TC 4+	OTB	7	4VW	306	1790	2230	0.00996	3.03793	Cameron 250/251	July 1976
	Jan-Dec	TC 4+	OTB	22	4X+5	803	5354	9041	0.00588	3.13928	Cameron 250/251	July 1976
1977	Jan-Dec	TC 1-6	GN, LL, Other	1	4VWX+5	30	256	4880	0.03096	2.76665	Cameron 265/266	July 1977
	Jan-Dec	TC 4+	OTB	16	4VW	736	4321	6794	0.01251	2.99009	Cameron 265/266	July 1977
	Jan-Dec	TC 4+	OTB	36	4X+5	1420	8182	9028	0.03046	2.76665	Cameron 265/266	July 1977
1978	Jan-Dec	TC 1-6	GN, LL, Other	10	4VWX+5	179	1821	6152	0.027	2.81326	Cameron 279/280	July 1978
	Jan-Dec	TC 4+	OTB	14	4VW	529	4786	5899	0.02081	2.86517	Cameron 279/280	July 1978
	Jan-Dec	TC 4+	OTB	31	4X+5	1019	8513	10446	0.0270	2.81326	Cameron 279/280	July 1978
1979	Jan-Dec	TC 1-6	GN, LL, Other	3	4VWX+5	137	938	7685	0.01350	2.95963	Cameron 292/293	July 1979
	Jan-Dec	TC 1-3	OTB	2	4VWX+5	56	387	6092	0.01350	2.95963	Cameron 292/293	July 1979
	Jan-Apr	TC 4+	OTB	3	4VW	99	853	1331	0.04196	2.67328	Hammond 13/14	March 1979
	May-Aug	TC 4+	OTB	28	4VW	875	8458	5008	0.01358	2.97418	Cameron 292/293	July 1979
	Sept-Dec	TC 4+	OTB	1	4VW	23	194	1710	0.00924	3.05383	Hammond 26/27	Oct 1979
	Jan-Apr	TC 4+	OTB	5	4X+5	161	1179	3414	0.0114	2.98252	Hammond 13/14	March 1979
	May-Aug	TC 4+	OTB	5	4X+5	174	1547	3246	0.01350	2.95963	Cameron 292/293	July 1979
	Sept-Dec	TC 4+	OTB	1	4X+5	37	266	982	0.00388	3.26457	Hammond 26/27	Oct 1979

Table 9 Continued.

Year	Period	Tonnage Class	Gears	No. of Samples	Area	Number Aged	Number Measured	Catch (t)	Weight-Length Relationship a	b	Cruise	
1980	Jan-Dec	TC 1-6	GN, LL, Other	3	4VWX+5	55	377	9351	0.04400	2.6941	Cameron 306/307	July 1980
	Jan-Dec	TC 1-3	OTB	9	4VWX+5	286	2135	6685	0.04400	2.6941	Cameron 306/307	July 1980
	Jan-Apr	TC 4+	OTB	9	4VW	282	2023	2315	0.01931	2.84627	Hammond 33/34	March 1980
	May-Aug	TC 4+	OTB	2	4VW	88	833	3849	0.03871	2.70659	Cameron 306/307	July 1980
	Sept-Dec	TC 4+	OTB	10	4VW	335	2462	3235	0.00864	3.08543	Hammond 42/43	Oct 1980
	Jan-Apr	TC 4+	OTB	10	4X+5	320	2650	4307	0.00782	3.06568	Hammond 33/34	March 1980
	May-Aug	TC 4+	OTB	6	4X+5	172	1418	3409	0.04400	2.69410	Cameron 306/307	July 1980
	Sept-Dec	TC 4+	OTB	12	4X+5	444	2541	2380	0.00820	3.09256	Hammond 42/43	Oct 1980
1981	Jan-Dec	TC 1-6	GN, LL, Other	8	4VWX+5	216	1810	9829	0.01246	2.98215	Hammond 64/65	Oct 1981
	Jan-Dec	TC 1-3	OTB	27	4VWX+5	901	6010	6268	0.01859	2.92225	Cameron 321/322	July 1981
	Jan-Apr	TC 4+	OTB	8	4VW	224	2099	3903	0.00581	3.12942	Hammond 48/49	March 1981
	May-Aug	TC 4+	OTB	5	4VW	143	1261	1342	0.03077	2.76718	Cameron 321/322	July 1981
	Sept-Dec	TC 4+	OTB	4	4VW	130	937	8417	0.00847	3.07881	Hammond 64/65	Oct 1981
	Jan-Apr	TC 4+	OTB	4	4X+5	244	1915	4223	0.00976	3.01206	Hammond 48/49	March 1981
	May-Aug	TC 4+	OTB	2	4X+5	64	532	558	0.01589	2.9225	Cameron 321/322	July 1981
	Sept-Dec	TC 4+	OTB	2	4X+5	66	488	4956	0.01246	2.98215	Hammond 64/65	Oct 1981
1982	Jan-Dec	TC 1-6	GN, LL, Other	14	4VWX+5	402	2605	10980	0.03023	2.76957	Hammond 80/81	July 1982
	Jan-Dec	TC 1-3	OTB	18	4VWX+5	659	4348	7720	0.03023	2.76957	Hammond 80/81	July 1982
	Jan-Apr	TC 4+	OTB	7	4VW	229	1686	2659	0.01446	2.91396	Hammond 71/72	March 182
	May-Aug	TC 4+	OTB	7	4VW	228	1623	3043	0.0377	2.75290	Hammond 80/81	July 1982
	Sept-Dec	TC 4+	OTB	4	4VW	146	912	4033	0.00469	3.22032	Needler 002/003	Oct 1982
	Jan-Apr	TC 4+	OTB	9	4X+5	293	2172	1628	0.01055	2.99328	Hammond 71/72	March 1982
	May-Aug	TC 4+	OTB	5	4X+5	203	1197	3645	0.03023	2.76957	Hammond 80/82	July 1982
	Sept-Dec	TC 4+	OTB	11	4X+5	396	2606	3665	0.00874	3.08571	Nedler 002/003	Oct 1983
1983	Jan-Dec	TC 1-6	Gn, LL, Other	18	4VWX+5	499	3487	8264	0.01149	2.98690	Needler 12/13	July 1983
	Jan-Dec	TC 1-3	OTB	37	4VWX+5	1236	9376	9492	0.01149	2.98690	Needler 12/13	July 1983
	Jan-Aug	TC 4+	OTB	38	4VW	1171	9812	7864	0.02903	2.76587	Needler 12/13	July 1983
	Sept-Dec	TC 4+	OTB	7	4VW	162	1994	1029	0.01134	3.00190	Needler 17/18	Oct 1983
	Jan-Aug	TC 4+	OTB	30	4X+5	1056	8310	5516	0.01149	2.98690	Needler 12/13	July 1983
	Sept-Dec	TC 4+	OTB	1	4X+5	43	356	396	0.01047	3.03012	Needler 17/18	Oct 1983
1984	Jan-Dec	TC 1-6	GN, LL, Other	14	4VWX+5	347	2862	7038	0.02339	2.8404	Needler 31/32	July 1984
	Jan-Dec	TC 1-3	OTB	32	4VWX+5	1119	8642	14184	0.02339	2.8404	Needler 31/32	July 1984
	Jan-Apr	TC 4+	OTB	12	4VW	346	3024	2080	0.01171	2.96209	Needler 24/25	March 1984
	May-Aug	TC 4+	OTB	15	4VW	345	3180	3091	0.02134	2.84581	Needler 31/32	July 1984
	Sept-Dec	TC 4+	OTB	15	4VW	431	3410	3550	0.01134	3.00190	Needler 17/18	Oct 1983

Table 9. Continued.

Year	Period	Tonnage Class	Gears	No. of Samples	Area	Number Aged	Number Measured	Catch (t)	Weight-Length Relationship a	b	Cruise	
1984	Jan-Apr	TC 4+	OTB	6	4X+5	203	1575	728	0.00984	3.00564	Needler 24/25	March 1984
	May-Aug	TC 4+	OTB	2	4X+5	75	624	1563	0.02339	2.84041	Needler 31/32	July 1984
	Sept-Dec	TC 4+	OTB	1	4X+5	23	218	564	0.01047	3.03012	Needler 17/18	Oct 1983
1985	Jan-Dec	TC 1-6	GN, LL, Other	23	4VWX+5	442	3845	11631	0.01654	2.90193	Needler 48/49	July 1985
	Jan-Dec	TC 1-3	OTB	26	4VWX+5	694	5902	15673	0.01654	2.90193	Needler 48/49	July 1985
	Jan-Apr	TC 4+	OTB	10	4VW	278	2313	3464	0.01171	2.96209	Needler 24/25	March 1984
	May-Aug	TC 4+	OTB	18	4VW	491	4199	3687	0.01920	2.85330	Needler 48/49	July 1985
	Sept-Dec	TC 4+	OTB	14	4VW	379	3137	4514	0.01134	3.00190	Needler 17/18	Oct 1983
	Jan-Apr	TC 4+	OTB	2	4X+5	72	541	580	0.00984	3.00564	Needler 24/25	March 1984
	May-Aug	TC 4+	OTB	3	4X+5	111	766	829	0.01654	2.90193	Needler 48/49	July 1985
	Sept-Dec	TC 4+	OTB	2	4X+5	70	395	876	0.01047	3.03012	Needler 17/18	Oct 1983
1986	Jan-Dec	TC 1-6	GN, LL, Other	37	4VWX+5	631	6357	14739	0.01611	2.91262	Needler 48/49	July 1985
	Jan Dec	TC 1-3	OTB	42	4VWX+5	1306	9481	10419	0.01611	2.91262	Needler 48/49	July 1985
	Jan-Apr	TC 4+	OTB	22	4VW	566	4679	4861	0.01762	2.86994	Needler 48/49	July 1985
	May-Aug	TC 4+	OTB	20	4VW	556	4697	6499	0.01762	2.86994	Needler 48/49	July 1985
	Sept-Dec	TC 4+	OTB	12	4VW	354	2860	3957	0.01762	2.86994	Needler 48/49	July 1985
	Jan-Apr	TC 4+	OTB	5	4X+5	137	1370	1326	0.01611	2.91262	Needler 48/49	July 1985
	May-Aug	TC 4+	OTB	3	4X+5	82	653	939	0.01611	2.91262	Needler 48/49	July 1985
	Sept-Dec	TC 4+	OTB	-	4X+5	-	-	235	0.01611	2.91262	Needler 48/49	July 1985
1987	Jan-Aug	TC 1-6	GN, LL, Other	21	4VWX+5	396	4198	1703	0.013	2.95321	Needler 85/86/87	July 1986
	Jan-Aug	TC 1-3	OTB	45	4VWX+5	1173	10980	8327	0.013	2.95321	Needler 85/86/87	July 1986
	Jan-Aug	TC 4+	OTB	34	4VW	599	7471	5988	0.025	2.79831	Needler 85/86/87	July 1986
	Jan-Aug	TC 4+	OTB	17	4X+5	245	4450	3064	0.013	2.95321	Needler 85/86/87	July 1986

Table 10. Comparison of the catch at age from the 1985 assessment to the 1986 catch at age produced for this assessment.

RATIO OLD. CATCH AT AGE TO NEW CATCH AT AGE

7/ 9/87

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
2	0.166	0.956	1.001	1.227	0.785	0.972	1.056	1.012	1.001	1.006	0.956	0.997	1.063	0.872	1.000	0.994
3	0.633	1.010	1.001	0.974	1.002	1.012	1.000	1.017	0.777	1.004	0.734	1.002	1.066	0.786	1.013	0.979
4	0.831	0.982	1.197	1.014	1.011	1.012	0.777	1.026	1.016	1.007	0.780	0.777	1.005	1.018	1.013	1.000
5	0.774	1.001	0.738	0.787	1.015	1.003	0.993	1.004	1.010	1.025	0.777	0.994	1.004	1.002	1.025	1.028
6	0.729	1.003	0.778	0.779	1.031	1.003	0.994	0.994	0.775	1.022	1.006	1.017	1.014	0.787	1.005	1.014
7	1.329	1.040	1.002	0.786	1.002	0.977	0.772	0.774	1.002	0.788	1.006	1.023	1.017	1.002	0.778	1.047
8	1.674	0.993	1.008	1.072	0.776	0.991	1.018	0.786	1.003	1.018	0.777	1.024	1.017	0.778	0.988	1.030
9	1.360	0.825	0.664	0.956	1.032	1.027	1.047	0.747	1.000	1.006	0.775	1.004	0.777	1.003	0.773	1.015
10	1.633	0.714	6.467	0.951	0.716	0.994	2.352	1.002	1.037	1.007	1.003	1.032	1.014	1.001	0.778	1.011
11	2.475	1.000	0.792	0.951	0.921	0.999	1.126	1.022	1.005	1.013	1.005	1.004	1.013	0.773	0.994	1.009

Table 11. Total catch at age and catch at age by area for pollock (1970-1986).

A. TOTAL CATCH AT AGE 6/ 9/87

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
1	0	0	0	0	0	0	0	0	0	8	0	0	0	1	1	2	2
2	567	1518	798	1187	261	260	234	56	115	278	361	679	2420	94	54	218	320
3	589	2427	2165	2925	7336	1434	2189	1748	1545	4075	705	2748	4780	2725	1189	3884	4124
4	1543	2371	2803	7128	3446	2287	3084	3774	3591	7403	3788	1307	2838	11971	5121	8737	8047
5	1360	2090	1852	5071	3038	2563	5343	2442	3658	4400	6737	3884	944	1880	7854	5848	4473
6	872	1574	724	728	1367	2378	1458	2779	1881	2145	4048	4643	2574	426	1247	7788	5367
7	685	541	483	289	494	1940	1342	1947	2078	757	1581	2701	2587	868	296	1342	4611
8	463	192	110	103	213	283	272	673	800	527	463	742	1525	787	572	1068	4483
9	212	3	365	256	78	88	41	206	410	152	330	303	555	543	362	383	1139
10	123	3	26	87	100	85	18	81	101	82	109	283	282	279	173	343	1360
11	44	0	80	13	81	58	21	45	103	39	45	83	178	133	80	178	1206
12	8	0	85	5	45	49	57	274	227	112	78	147	220	261	138	174	1911

B. CATCH AT AGE 4VW 6/ 9/87

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	2	2
2	543	1186	552	1033	16	221	87	16	20	27	55	68	50	18	11	20	13
3	131	1197	142	784	778	310	202	1866	144	2264	79	1388	1800	894	332	1220	1111
4	148	387	555	1773	426	1280	297	1077	1027	1878	347	508	788	3780	778	1528	1218
5	83	168	365	761	387	574	573	446	378	1343	1654	360	78	231	305	1169	1511
6	97	110	80	115	278	316	218	321	338	716	1070	1757	688	58	136	2697	1807
7	160	46	42	41	96	104	174	141	283	145	326	1038	778	128	28	1133	1933
8	160	16	7	26	24	63	36	103	70	77	133	437	423	322	87	387	1297
9	53	0	247	178	38	11	7	43	58	14	85	99	155	137	43	445	623
10	40	0	8	0	44	0	9	0	6	6	172	71	162	73	68	864	1197
11	83	0	4	0	47	0	36	46	18	7	34	17	38	24	7	341	1011
12	0	0	0	0	38	0	32	46	18	6	1	17	12	23	7	144	1111

C. CATCH AT AGE 4W5 6/ 9/87

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
1	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0
2	24	353	746	1340	245	238	148	40	113	271	309	631	1230	78	83	221	138
3	458	1259	2627	1741	6551	1118	1786	748	1401	3822	624	2610	3077	2135	778	2474	4113
4	1404	2002	2377	7103	3020	3991	2787	2175	2564	5708	3439	1227	2037	7161	4426	7747	6756
5	1277	1832	1487	4515	2635	1789	4740	1776	2560	3057	5082	3474	774	1927	6622	4477	3356
6	795	1464	884	3068	1081	1382	1237	2658	1543	1430	2758	2914	2108	5725	1118	6397	4160
7	525	474	451	2488	338	934	1209	805	1775	614	1055	1403	1817	743	196	707	4468
8	303	216	103	776	189	200	238	570	510	450	330	503	702	867	305	187	2807
9	161	3	83	802	66	88	34	183	302	145	245	204	400	366	281	191	2338
10	83	3	18	781	66	85	6	78	148	56	70	172	180	207	150	218	1772
11	20	0	76	13	32	58	13	30	85	32	42	83	140	168	80	99	1195
12	8	0	81	5	14	49	27	228	209	112	77	130	208	261	138	150	1911

Table 12. Weights at age by area for pollock (1970 1986).

A. TOTAL WEIGHT AT AGE 4VWX5 6/ 9/87

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	19	1982	1983	1984	1985	1986
1	0.00	0.00	0.00	0.00	0.00	.00	0.00	0.00	0.00	0.12	0.00	0.	0.00	0.63	0.36	0.00	0.10
2	0.56	0.78	1.06	0.20	0.82	.88	0.80	0.83	0.84	0.73	0.75	0.	0.80	0.73	1.03	0.70	0.80
3	1.36	1.79	1.86	1.27	1.40	.28	1.23	1.13	1.23	1.12	1.37	1.	1.13	1.16	1.47	1.04	1.12
4	2.19	2.12	2.77	1.75	1.76	.77	1.71	1.60	1.80	1.64	1.75	2.	2.00	1.87	2.16	1.74	1.80
5	3.05	3.16	4.28	2.35	3.01	.66	2.77	2.60	2.88	2.73	2.77	2.	3.01	3.06	2.84	2.77	2.57
6	3.78	4.00	5.27	3.76	4.07	.80	3.67	3.53	3.72	3.54	3.52	3.	4.15	4.16	3.61	3.26	3.40
7	4.77	4.77	5.75	4.36	5.06	.07	4.61	4.56	4.63	4.66	4.22	4.	4.92	4.88	5.15	3.78	3.84
8	5.82	6.24	6.52	6.23	6.12	.52	5.58	5.67	5.79	5.66	5.66	5.	5.27	5.18	5.72	5.47	4.84
9	7.08	7.25	8.03	6.31	6.96	.56	7.00	6.81	6.53	6.78	6.78	6.	6.01	6.91	6.77	6.98	6.16
10	7.10	9.62	7.60	7.42	7.38	.58	7.72	7.06	6.77	7.47	7.71	7.	7.03	6.72	6.52	6.38	6.80
11	9.09	0.00	6.81	8.24	8.52	.31	8.54	8.80	7.58	8.18	7.87	7.	7.77	7.71	7.62	6.67	6.72
12	8.11	0.00	9.56	8.68	9.73	.74	9.23	9.06	7.93	8.31	8.84	8.	8.27	8.26	8.54	8.62	7.95

B. WEIGHT AT AGE 4VW 6/ 9/87

	1970	1971	1972	1973	197	1975	1976	1977	1978	1979	19	1981	1982	1983	1984	1985	1986
1	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	0.12	0.	0.00	0.00	0.63	0.36	0.00	0.10
2	0.56	0.72	1.06	0.46	0.8	0.84	0.85	0.72	0.82	0.75	0.	0.87	0.83	0.83	1.02	0.83	0.96
3	1.13	1.63	1.86	1.04	1.4	1.13	1.02	1.08	0.94	1.03	1.	1.13	1.07	1.20	1.53	1.02	1.04
4	1.94	2.14	1.74	2.11	1.7	1.67	1.78	1.39	1.58	1.61	1.	2.38	2.72	1.44	2.16	1.83	1.80
5	2.48	3.21	3.92	2.70	2.9	2.54	2.69	2.47	2.36	2.	2.	2.79	3.17	2.76	2.30	2.42	2.16
6	3.13	4.00	5.27	3.97	4.	3.34	3.60	3.35	3.75	3.25	3.	3.82	3.73	3.78	3.46	3.32	3.28
7	4.10	4.73	5.75	4.91	5.	4.60	4.73	5.04	4.45	4.97	3.	4.33	4.47	4.43	4.67	2.78	3.84
8	5.54	6.24	6.52	6.45	6.	6.38	5.90	5.73	6.17	5.58	5.	6.14	4.90	4.72	5.70	4.27	3.96
9	6.76	27.00	9.48	6.88	6.	7.40	6.74	6.87	7.10	6.31	6.	7.50	6.46	5.38	5.62	5.42	4.84
10	7.28	9.62	7.60	8.08	7.	8.34	8.26	7.56	8.27	8.71	7.	8.15	7.78	8.16	8.15	8.48	8.16
11	9.11	0.00	6.81	9.33	8.	8.47	9.46	10.77	8.54	9.31	8.	7.72	7.81	7.71	7.82	8.46	8.04
12	8.11	0.00	9.56	9.66	10.	9.49	8.68	11.39	10.20	9.00	11.	9.00	8.30	8.74	8.79	7.48	8.74

C. WEIGHT AT AGE 4VS 6/ 9/87

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	19	1982	1983	1984	1985	1986
1	0.00	0.00	0.00	0.00	0.00	.00	0.00	0.00	0.00	0.12	0.00	0.	0.00	0.00	0.00	0.00	0.00
2	0.60	1.67	1.06	0.82	0.84	.86	0.83	0.88	0.84	0.73	0.77	0.	0.82	0.78	1.03	0.73	0.84
3	1.45	2.32	1.86	1.35	1.43	.82	1.25	1.20	1.26	1.20	1.38	1.	1.16	1.15	1.48	1.03	1.17
4	2.25	2.12	2.73	1.79	1.77	.08	1.72	1.75	1.87	1.65	1.76	2.	2.00	1.77	2.15	2.13	1.79
5	3.09	3.15	4.44	2.64	3.03	.21	2.78	2.70	2.83	2.87	2.72	2.	3.04	3.11	2.77	2.71	2.72
6	3.88	4.00	5.29	3.96	4.07	.00	3.70	3.53	4.00	3.68	3.73	3.	4.17	4.17	3.53	3.48	3.71
7	4.78	5.00	5.75	4.35	5.01	.15	4.57	4.48	4.66	4.79	4.52	4.	4.82	4.78	5.17	4.17	4.38
8	5.77	6.24	6.52	6.15	6.34	.80	5.80	5.68	5.73	5.67	5.84	5.	5.47	5.40	5.73	5.67	5.64
9	7.18	7.25	6.84	6.38	6.59	.54	7.06	6.79	6.50	6.77	6.66	6.	6.12	6.32	6.12	6.57	6.54
10	7.02	9.62	7.60	7.35	7.23	.53	6.73	7.04	6.74	7.53	7.31	7.	7.05	6.72	6.58	6.64	7.02
11	9.07	0.00	6.81	8.23	8.00	.31	7.97	7.80	7.50	8.01	7.75	7.	7.72	7.71	7.47	6.76	7.02
12	8.11	0.00	9.56	8.68	9.12	.74	9.84	8.56	7.83	8.31	8.81	8.	8.27	8.87	8.52	8.76	8.41

Table 13. Percent catch at age and percent biomass at age for pollock (1970-1986).

A. PERCENT CATCH AT AGE 8/ 9/87

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	9	14	8	6	2	2	2	0	1	1	2	4	2	0	0	1	0
3	9	23	23	14	45	11	16	13	11	20	4	16	30	14	6	11	6
4	24	22	28	46	21	39	22	28	26	37	21	7	14	58	28	13	25
5	21	19	17	27	19	19	38	18	25	22	37	22	5	10	52	37	19
6	14	15	10	4	8	18	10	22	13	11	22	25	16	2	7	37	23
7	11	5	5	1	2	8	10	8	14	4	9	15	16	5	1	6	20
8	7	2	1	1	1	2	2	5	4	3	3	5	8	5	2	1	2
9	3	0	4	1	1	1	0	2	3	1	2	2	4	3	2	1	1
10	2	0	0	0	1	1	0	1	1	0	1	1	2	1	1	2	1
11	1	0	1	0	0	0	0	0	1	0	0	0	1	1	0	1	1
12	0	0	1	0	0	0	0	2	2	1	0	1	1	1	1	1	1

B. PERCENT BIOMASS AT AGE 8/ 9/87

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2	4	3	1	1	1	0	0	0	0	1	1	0	0	0	0	0
3	4	15	12	8	27	5	7	5	4	10	2	7	18	7	3	4	2
4	16	19	22	41	18	27	16	16	14	26	13	6	11	39	23	9	16
5	20	23	24	32	24	28	39	17	22	28	34	20	6	12	50	26	17
6	16	23	15	7	15	24	14	27	16	16	26	27	28	4	9	41	26
7	16	10	9	3	5	14	16	12	21	8	12	20	22	9	2	8	15
8	13	5	2	1	3	4	4	10	8	6	5	9	13	11	4	2	4
9	7	0	9	4	2	2	1	4	6	2	4	4	7	7	4	2	1
10	4	0	1	1	2	2	0	1	2	1	2	3	4	4	2	4	1
11	2	0	1	0	2	1	0	1	2	1	1	1	3	2	1	1	1
12	0	0	2	0	1	1	1	6	4	2	1	2	3	5	2	2	1

Table 14a. Commercial catch rates (t/hr) for pollock (main species) in Divisions 4VWX and Subarea 5.

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Canadian OTB-2 (TC5) CPUE (t/hr^{-1})																	
June-August	.74	.78	.81	1.07	.58	.61	.52	.69	.84	1.16	.97	.89	1.58	.87	1.28	.70	1.38

Table 14b. International Observer Program (IOP) catch rates (t/hr) for pollock (main species) in Divisions 4VWX and Subarea 5.

	1982	1983	1984	1985	1986
Canadian OTB-2 (TC5) CPUE (t/hr^{-1})					
June-August	1.59	.87	1.33	2.04	1.59

Table 15 . Stratified mean numbers-per-standard-tow in Canadian summer trawl surveys (Strata 43 - 95).

	Year																	
Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
1	0.008	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.012	0.007	0.000	0.108	0.037	0.008	0.047	0.000
2	1.937	0.764	0.021	0.429	0.042	0.009	0.031	0.280	0.008	0.000	1.224	0.170	0.210	0.127	0.503	1.577	0.650	0.627
3	0.477	0.589	0.014	0.557	0.855	0.019	0.235	0.826	0.154	0.116	1.340	0.188	2.974	0.974	0.244	4.879	0.700	2.537
4	0.289	0.178	0.156	2.372	0.213	0.348	0.715	1.056	0.650	0.665	3.543	0.054	0.286	1.830	0.750	3.759	1.028	3.843
5	0.211	0.042	0.344	0.882	0.278	0.299	1.328	2.175	1.013	0.836	5.569	0.543	0.127	0.184	2.151	3.611	1.074	5.898
6	0.191	0.019	0.150	0.097	0.130	0.401	0.333	1.517	0.376	0.607	1.409	0.527	0.394	0.051	0.328	2.878	1.465	1.941
7	0.128	0.029	0.040	0.057	0.139	0.064	0.572	0.197	0.352	0.249	0.767	0.366	0.271	0.097	0.223	0.428	1.069	1.520
8	0.070	0.012	0.073	0.052	0.078	0.098	0.211	0.331	0.109	0.180	0.220	0.254	0.159	0.281	0.487	0.116	0.075	1.044
9	0.027	0.008	0.053	0.068	0.059	0.038	0.046	0.116	0.051	0.011	0.083	0.117	0.140	0.178	0.737	0.214	0.011	0.054
10	0.000	0.019	0.025	0.002	0.038	0.009	0.048	0.055	0.024	0.039	0.044	0.081	0.077	0.061	0.457	0.331	0.107	0.119
11	0.038	0.000	0.013	0.015	0.079	0.010	0.016	0.033	0.000	0.000	0.000	0.031	0.013	0.063	0.076	0.117	0.141	0.084
12+	0.007	0.000	0.028	0.012	0.033	0.000	0.051	0.012	0.025	0.000	0.000	0.014	0.053	0.022	0.167	0.108	0.091	0.368
UK	0.000	0.000	0.004	0.015	0.000	0.000	0.012	0.004	0.018	0.025	0.031	0.049	0.036	0.029	0.047	0.004	0.008	0.030
TOTAL	3.392	1.660	0.922	4.559	1.950	1.296	3.597	6.602	2.780	2.737	14.242	2.402	4.738	4.005	6.208	18.030	6.466	18.064
4+	0.963	0.306	0.883	3.559	1.046	1.267	3.319	5.492	2.601	2.587	11.635	1.987	1.518	2.767	5.377	11.562	5.061	14.869
5+	0.673	0.128	0.726	1.186	0.833	0.919	2.605	4.436	1.951	1.922	8.092	1.932	1.233	0.937	4.627	7.804	4.033	11.026
6+	0.462	0.086	0.382	0.304	0.556	0.620	1.277	2.260	0.938	1.086	2.522	1.390	1.106	0.753	2.476	4.192	2.960	5.128

Table 16 Mean numbers/tow for 4VWX + 5 Pollock in Canadian summer bottom trawl surveys*.

	Year																		
Strata	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	All
40	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.26	.41	45.11	3.94
41	.00	3.94	.00	.00	.00	.00	.00	.00	.31	.00	.00	1.46	.65	1.30	.29	1.03	.21	37.43	3.14
42	.32	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.34	.00	.16	0.05
43	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.21	.18	.00	.00	.00	.00	0.03
44	.00	.00	.00	.00	.00	.00	.00	.17	.00	.00	.00	.00	.00	.00	.00	.26	.83	.34	0.11
45	.00	.00	.19	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	18.03	.17	5.85	1.85
46	.00	.00	.00	.00	.00	.00	.00	.34	.00	.00	.00	.00	.97	16.47	.00	3.09	.69	.00	1.30
47	.00	.00	.00	.37	.00	.44	.00	.00	.00	.61	.00	.00	.51	.26	.00	.00	.00	.00	0.11
48	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	0.00
49	.00	.00	.00	.00	.00	.00	.00	.00	.00	4.08	.00	.00	.00	.00	5.35	.00	.52	.00	0.59
50	.00	.00	.00	.00	.00	.36	.00	.00	.00	1.56	.00	15.10	1.09	.00	.00	.00	.34	.34	1.11
51	.00	.00	.00	.00	.00	.00	.55	.49	3.13	25.93	.00	2.92	571.50	.00	.00	96.76	.73	133.02	63.00
52	.00	1.14	.46	.00	.00	.00	.00	.55	.49	3.60	.00	.00	5.05	3.60	113.75	6.69	60.03	.34	10.88
53	.00	.00	.00	.00	.00	.00	.00	.34	.00	.00	.00	.00	.00	.00	.00	.00	.34	.00	0.04
54	.00	.00	.34	.00	.00	.00	.00	.00	.39	.00	.00	.00	.00	.00	.00	1.05	.00	.00	0.10
55	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.29	1.42	.26	.00	.00	.13	.12	0.14
56	.39	.27	.00	.18	.00	.00	.00	.34	.00	.00	.00	.00	.00	.16	2.97	1.94	.17	.70	0.43
57	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.49	.00	.00	.00	.00	.00	0.03
58	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	2.27	.00	.00	.44	.00	0.17
59	.76	.44	.00	.58	.00	.00	.20	.63	.24	.00	.00	.00	.00	.58	17.06	2.34	10.47	3.28	2.41
60	75.99	.00	.83	4.12	.00	5.07	.00	.97	14.72	1.45	353.50	.97	6.55	29.17	36.66	12.40	8.92	337.21	45.68
61	.00	.00	.00	.51	.00	20.26	.00	2.78	.00	.00	.00	.00	2.76	1.46	1.61	5.06	3.78	11.67	2.95
62	.00	.65	.00	.00	5.10	2.73	.23	.00	3.82	1.22	55.19	6.87	.78	.00	1.29	48.10	14.78	3.98	9.64
63	.00	.00	.00	.00	.00	3.31	6.13	1.17	.00	3.89	.51	5.41	.23	4.86	.00	1.46	1.72	4.46	1.87
64	.00	.00	.19	.00	.00	.00	.32	1.79	3.52	.97	.00	.00	.00	41.22	.62	2.96	.28	4.57	3.38
65	.19	14.00	.00	.00	20.85	1.17	2.33	1.95	.41	.21	.00	.85	.15	.51	1.29	2.72	.19	5.65	3.17
66	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	3.24	.39	.55	0.23
70	2.19	3.46	.38	27.47	2.43	.49	96.62	18.47	74.79	9.30	1.09	16.40	.00	42.41	6.56	60.82	19.56	72.06	25.89
71	.00	.00	.00	.55	.00	.00	.00	6.35	3.04	.00	4.86	1.37	.00	.97	1.63	27.79	4.63	108.57	8.88
72	2.06	22.75	.82	1.09	2.57	.00	2.13	1.74	.46	.34	16.42	5.83	.49	5.47	1.75	377.22	6.18	3.60	23.32
73	.00	.00	.00	.00	.00	.00	.00	.55	.00	.00	.38	.00	.00	.00	.00	.49	2.13	.51	0.23
74	.00	.24	.00	.00	.00	.00	.00	.00	.00	.00	.34	.00	.00	.00	.00	.00	1.88	.55	0.17
75	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.51	.00	1.03	.00	0.09
76	1.09	.49	.00	9.24	5.72	7.70	2.19	20.79	1.75	.00	1.17	.00	.00	6.03	50.95	.00	26.74	1.35	7.85
77	.00	.00	.44	1.84	.00	.00	.00	.00	.00	.58	.00	.00	.00	1.03	.00	.00	.00	23.50	3.40
78	1.46	2.43	.88	.97	.00	1.09	.00	.00	1.75	1.29	.00	.00	.00	.00	.00	3.89	.36	.00	0.77
80	.49	.52	.19	.00	.00	.00	.23	34.81	.55	.00	.97	.18	.51	1.46	.00	1.84	2.60	11.74	3.38
81	.00	2.92	.00	10.00	1.30	.00	.29	.00	2.11	.00	1.82	1.46	1.80	2.73	.26	.46	8.14	.51	1.79
82	.49	.46	.46	.00	.00	.00	.32	.73	1.07	13.64	1.35	4.04	1.41	1.00	.88	.49	1.03	4.25	2.08
83	.00	.00	2.43	.00	.00	.00	1.95	.49	.00	.58	.78	.00	.52	.51	1.54	.49	.00	1.64	0.55
84	.00	.55	1.25	1.63	1.34	1.58	21.52	2.38	.49	9.82	.25	16.54	.26	.00	3.43	3.56	2.40	4.72	4.13
85	23.72	.00	7.00	83.38	2.17	.00	1.99	127.10	1.59	19.79	21.61	3.57	58.78	1.70	23.70	13.35	46.03	14.24	24.43

Table 16. (Continued)

Strata	Year																		
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	All
90	9.85	.00	.00	.26	3.98	1.19	8.17	.78	8.61	3.28	1.35	15.75	2.60	8.20	.00	67.91	2.94	.23	8.88
91	.00	.38	25.14	5.10	1.13	.65	2.52	1.53	.00	46.01	1.92	.53	.60	1.88	3.09	4.55	26.08	64.80	11.28
92	.32	.00	4.37	1.63	3.19	2.02	2.10	3.68	2.27	.00	.00	.29	11.08	1.03	.36	.65	6.32	3.47	2.53
93	.00	.00	.00	1.54	.00	.46	.58	1.16	.00	.69	1.32	.00	4.25	1.94	.00	46.94	.65	4.12	4.11
94	.00	.00	.00	.00	.42	.46	2.17	.00	.00	1.03	.51	.00	.00	.00	.55	.49	.00	.00	0.30
95	.00	.00	2.02	.19	1.54	.70	.00	.00	.00	1.06	1.21	2.92	.00	.67	.00	.92	.00	.00	0.63

* Survey vessels: 1970 - 1981 — A.T. Cameron
1982 — Lady Hammond
1983 - 1987 — Alfred Needler

Table 17. Stratified mean catch-per-tow in weight (kg) and numbers for Scotian Shelf, Gulf of Maine, and Georges Bank pollock in NEFC[1] offshore spring, summer, and autumn bottom trawl surveys, 1963-1986[2].

	SPRING (Str. 13-40)		SUMMER (Str. 21-28, 37-40)		AUTUMN (Str. 13-40)	
	Weight	Numbers	Weight	Numbers	Weight	Number
Year	Linear	Linear	Linear	Linear	Linear	Linear
1963	-	-	10.28	2.31	5.79	1.46
1964	-	-	5.27	2.06	4.40	1.64
1965	-	-	2.56	1.72	2.74	0.83
1966	-	-	-	-	2.35	0.97
1967	-	-	-	-	1.80	0.52
1968	4.47	1.09	-	-	3.17	0.69
1969	2.66	1.12	1.75	0.70	6.58	1.31
1970	4.91	1.67	-	-	2.59	0.64
1971	4.39	1.18	-	-	3.96	1.09
1972	5.67	4.43	-	-	4.37	1.41
1973	4.82	4.00	-	-	4.71	1.64
1974	4.10	1.39	-	-	3.17	0.90
1975	5.90	1.67	-	-	2.04	0.70
1976	6.84	1.59	-	-	16.66	3.69
1977	3.44	1.63	9.98	2.07	8.78	2.14
1978	6.56	2.48	4.05	1.29	5.83	0.98
1979	4.75	1.06	17.57	2.96	5.81	1.28
1980	4.40	1.52	9.83	12.21	4.63	0.83
1981	6.30	2.00	-	-	7.75	5.24
1982	6.62	3.98	-	-	3.14	1.40
1983	1.83	0.92	-	-	3.03	0.98
1984	2.87	1.00	-	-	0.99	0.41
1985	8.36	2.81	-	-	2.43	1.12
1986	7.69	1.84	-	-	1.83	0.88

[1] Northeastern Fisheries Centre

[2] The "36 Yankee" trawl was used from 1968-1972, and the "41 Yankee" trawl was used from 1973-1983. No gear conversion factors are available to adjust for differences in fishing power.

Table 18. Stratified mean catch-per-tow in numbers and weight (kg) for pollock in the Massachusetts inshore spring surveys[1], 1978-1986.

Year	Stratified Mean Catch-Per-Tow in Numbers AGE 0	1	2	3+	Total	Stratified Mean Catch-Per-Tow in Weight (kg)
Massachusetts (Spring)						
1978	2.07	0.01	0.13	0.06	2.27	0.11
1979	4.34	0.04	0.01	0.06	4.45	0.07
1980	0.30	8.37	0.20	0.02	8.89	0.72
1981	1.52	1.42	1.40	0.00	4.34	0.54
1982	1.79	0.00	0.06	0.00	1.85	0.03
1983	0.03	6.45	0.27	0.04	6.79	0.68
1984	0.04	0.00	0.02	0.00	0.06	0.01
1985	0.88	0.02	0.03	0.00	0.93	0.04
1986	0.22	0.01	0.00	0.00	0.23	0.003

[1] Regions 1-5 (STRATA 11-21 and 25-36).

Table 19. Average population partial recruitment vectors for the pollock fishery (1970-1986).

PARTIAL RECRUITMENT FOR STAGES

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
1	0.023	0.006	0.000	0.003	0.007	0.016	0.016	0.002	0.008	0.120	0.041	0.014	0.007	0.005	0.000	0.038	0.038
2	0.078	0.101	0.136	0.320	0.522	0.160	0.252	0.127	0.080	0.574	0.270	0.336	0.110	0.112	0.180	0.152	0.279
3	0.339	0.339	0.388	1.000	0.716	0.498	0.697	0.508	0.332	0.812	0.578	0.604	0.388	0.390	0.645	0.317	0.592
4	0.298	1.000	0.884	1.000	0.801	0.778	1.000	0.705	0.734	0.929	0.684	0.776	0.560	0.496	1.000	0.801	0.854
5	0.189	1.000	1.000	0.734	0.954	0.982	1.000	1.000	0.917	1.000	1.000	0.891	0.845	0.503	1.000	0.901	1.000
6	0.446	0.713	1.000	0.781	0.811	1.000	1.000	1.000	1.000	0.968	1.000	1.000	0.861	0.603	0.877	1.000	1.000
7	1.000	0.870	0.855	0.835	1.000	0.785	0.898	1.000	1.000	1.000	0.875	0.953	1.000	0.852	0.918	0.793	1.000
8	0.715	0.751	0.987	1.000	0.967	0.734	0.270	0.971	1.000	1.000	0.754	0.597	1.000	1.000	0.763	0.474	1.000
9	1.000	0.966	0.997	0.931	1.000	1.000	0.306	0.840	1.000	1.000	1.000	0.846	0.814	1.000	1.000	0.703	1.000
10	0.973	0.930	0.948	0.791	0.918	1.000	0.000	0.000	1.000	1.000	0.914	1.000	0.999	0.846	1.000	1.000	1.000

Table 20. Pollock fishing mortalities (1970-1986). F_t = .375.

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
1	0.022	0.041	0.034	0.025	0.011	0.003	0.002	0.001	0.004	0.035	0.016	0.007	0.003	0.003	0.003	0.003	0.003
2	0.259	0.112	0.077	0.042	0.018	0.078	0.086	0.053	0.030	0.138	0.129	0.135	0.092	0.063	0.063	0.063	0.063
3	0.240	0.337	0.191	0.303	0.139	0.442	0.279	0.210	0.147	0.178	0.178	0.302	0.178	0.178	0.178	0.178	0.178
4	0.339	0.351	0.191	0.711	0.331	0.878	0.405	0.292	0.124	0.270	0.335	0.335	0.227	0.227	0.227	0.227	0.227
5	0.337	0.805	0.387	0.349	0.295	0.477	0.220	0.124	0.104	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220
6	0.672	0.419	0.823	0.383	0.332	0.604	0.540	0.324	0.198	0.181	0.415	0.220	0.490	0.314	0.314	0.314	0.314
7	1.524	0.206	0.165	0.284	0.305	0.361	0.307	0.378	0.257	0.281	0.277	0.471	0.277	0.315	0.315	0.315	0.315
8	0.393	0.931	0.537	0.324	0.400	0.256	0.092	0.405	0.273	0.303	0.300	0.294	0.324	0.557	0.557	0.557	0.557
9	12.349	0.010	0.379	0.382	0.478	0.768	0.100	0.237	0.592	0.288	0.447	0.417	0.448	0.398	0.391	0.391	0.391
10	0.574	0.281	0.123	0.371	0.272	0.334	0.421	0.505	0.638	0.292	0.384	0.309	0.454	0.422	0.422	0.422	0.422

Table 21. Pollock mid-year population numbers (1970-1986). F_t = .375.

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
1	26131	36703	23766	46387	23583	32670	41609	54109	32298	8196	21929	9e615	58483	35044	47957	15971	4731
2	10471	13955	28247	17785	33804	18494	25481	33113	43524	24305	6492	1e428	7e491	16e1e	26073	33012	12888
3	6322	7101	14002	17482	11695	22013	12988	18054	24591	31252	16361	4319	11198	55035	3432e	21139	29133
4	4149	3483	3865	7508	9222	e865	13116	8133	11e67	16421	19109	9841	2e02	7212	35660	23776	15309
5	2315	1981	1591	2086	3468	5078	3851	7088	4701	e741	9557	10533	31e3	1e7e	e698	21087	13755
6	1359	1158	785	769	1212	1743	2510	2021	3518	2218	3837	1792	5441	1e92	1014	7e82	5e41
7	812	1132	763	406	427	e95	891	1177	905	181e	1e86	2024	2174	2797	1742	e41	1917
8	383	194	e44	143	241	225	444	513	477	448	110e	1037	893	986	1845	1167	771
9	11	211	70	347	212	113	145	30e	258	219	25e	e3e	590	490	498	1202	516
10	76	0	139	40	207	105	50	39	153	134	124	126	324	311	222	2e4	1e5
2+	52007	71934	73994	93282	84068	87901	101084	124604	121824	92599	80429	146380	1e3459	152928	155874	126341	8ece3
3+	25876	35230	50226	46895	60486	55331	59475	70495	89526	84103	5850e	49765	10497e	117884	107987	109367	82453
4+	15405	15276	21879	29110	26681	36837	33994	37382	1e002	09740	52024	33337	29485	71458	9915	71388	53113
5+	9083	8175	7877	11628	14986	14824	21007	19328	21408	28488	35663	29989	17287	16353	45589	50228	43001
6+	4935	4692	3992	4121	5764	7959	7890	11194	10041	12067	1e354	19148	14e85	9041	9929	27102	27e96

Table 22. Pollock mid-year biomass (1970-1986). F_t = .375.

1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	19
14679	2877e	25191	23201	19432	27931	24908	44988	27252	6197	20852	60012	35009	25702	19383	11134	331
14436	33943	52725	32518	47205	23884	31387	37482	53e46	28917	9014	24e63	86e36	53910	41227	39381	14e4
13831	159/5	38795	34058	22864	43762	24767	28883	44299	51354	31941	10798	29560	91398	73976	41070	501
12667	10998	16630	19892	27744	21033	36305	21174	30513	14820	53303	29015	9129	22406	94112	54041	3597
8749	7937	8416	8266	14172	19572	14198	25045	18538	2385e	33598	36200	21443	e559	16161	69280	4748
9875	6290	4669	3884	6128	8874	11560	9214	16279	12e0e	1e187	21000	24586	13573	9219	9836	4e2
1815	7067	4978	2532	2612	4529	4941	6674	5355	10273	9524	11779	11495	15201	10019	3314	937
2567	756	5e84	3020	1607	1695	3111	3494	3144	3022	7173	6969	6275	5930	11052	7377	23
76	2033	535	2571	1561	850	1121	2127	1745	1565	1898	4721	1323	3023	3247	7831	48
689	0	948	327	1762	872	425	784	1234	1093	973	970	2553	2401	1742	1759	875
78385	112874	158571	120269	145088	152905	152724	179893	202055	183764	184463	205530	229926	240e0e	30e139	254e24	21e18
63703	84098	133377	97068	125656	124871	127816	134905	174802	177567	163611	145518	194918	214904	258756	243489	21179
49270	50155	80651	74550	78451	101187	9e429	97424	121156	148650	154597	121453	108782	1e0994	215529	204109	19815
35439	35081	41857	40492	55587	57425	71662	68541	76857	9729e	122656	110657	79722	e7096	141553	163038	14801
22772	24083	25226	20600	27842	36392	35357	47367	4e345	52476	e9354	81e41	70593	4ece9	e7441	98997	11203

Table 23. OTB 4+ fishable biomass (1970-1986).

OTB FISHABLE BIOMASS (T) 17/ 9/87

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
2	10	495	1566	329	534	626	493	135	94	152	632	62	340	54	0	13	0
3	564	3843	7477	6222	23221	5497	9653	7198	4646	6398	1483	5455	15580	4841	7563	1861	1106
4	2987	7651	12658	34058	16393	29105	19940	20102	25688	34042	13834	3753	9896	45364	50461	18302	17261
5	3547	10465	12706	19892	22870	17116	36305	17844	30513	42220	19586	13660	3667	5295	97482	30110	35888
6	3095	7937	8416	6075	14172	19572	14188	21308	15390	23856	33598	33566	15921	1195	9928	69901	44547
7	3641	4457	4669	2980	4968	8874	11560	9214	16279	10537	16187	21000	24060	5011	1545	10075	47537
8	1815	2418	1329	1373	2612	3364	4171	6674	5179	6110	5889	10796	11495	11934	6449	1829	6825
9	1700	41	1536	1384	1599	1477	590	2080	2852	1313	4178	4125	5720	5930	7309	2769	1178
10	76	109	372	1363	1349	850	579	597	423	871	1244	3541	4323	3023	3247	5291	3049
11	506	0	751	251	1063	872	426	784	515	505	360	192	1993	1059	1048	1759	4356
2+	17940	37416	51480	73927	88779	87353	97904	85936	101578	126004	126992	96147	92995	83708	185032	141909	163748
3+	17930	36922	49914	73597	88245	86727	97412	85800	101484	125851	126360	96086	92655	83654	185032	141896	163748
4+	17366	33079	42437	67376	65024	81230	87759	78602	96839	119454	124876	90631	77075	78813	177469	140036	162642
5+	14379	25427	29780	33318	48631	52125	67819	58500	71151	85412	111043	86878	67178	33448	127008	121734	145381
6+	10833	14962	17074	13426	25762	35009	31514	40656	40638	43192	61457	73218	63511	28153	29526	91624	109493

Table 24. Annual partial recruitment for OTB 4+ vessels (1970-1986).

PARTIAL RECRUITMENT FOR OTB VESSELS 17/ 9/87

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
2	0.001	0.017	0.062	0.014	0.027	0.022	0.020	0.003	0.003	0.024	0.030	0.001	0.009	0.002	0.000	0.001	0.000
3	0.039	0.113	0.142	0.276	0.492	0.232	0.308	0.192	0.086	0.219	0.162	0.223	0.175	0.086	0.174	0.044	0.071
4	0.216	0.508	0.326	1.000	0.717	0.665	0.805	0.696	0.580	0.659	0.429	0.342	0.340	0.480	0.654	0.422	0.321
5	0.280	0.952	0.764	1.000	0.824	0.814	1.000	0.843	1.000	0.942	0.922	0.464	0.393	0.231	1.000	0.447	0.931
6	0.354	1.000	1.000	0.735	1.000	1.000	0.999	0.851	0.828	1.000	1.000	0.915	0.726	0.177	0.596	0.962	0.876
7	0.410	0.709	1.000	0.767	0.811	1.000	1.000	1.000	1.000	0.832	1.000	1.000	0.959	0.357	0.265	1.000	1.000
8	1.000	0.342	0.267	0.542	1.000	0.743	0.844	1.000	0.967	0.595	0.618	0.917	1.000	0.761	0.617	0.525	1.000
9	0.662	0.055	0.270	0.458	0.995	0.871	0.190	0.595	0.907	0.434	0.582	0.592	0.919	1.000	0.635	0.356	0.474
10	1.000	0.054	0.695	0.530	0.864	1.000	0.516	0.277	0.242	0.556	0.656	0.750	1.000	1.000	1.000	0.660	0.583
11	0.734	0.000	0.796	0.767	0.603	1.000	1.000	1.000	0.417	0.463	0.370	0.197	0.790	0.441	0.602	1.000	0.856

Table 25a. Calibration results for OTB 2 TC 5 (June - August) catch rates vs fishable biomass with annually calculated PR (1974-1986 excluding 1982).

	Terminal F					
	.25	.30	.35	.40	.45	.50
R	.742	.761	.770	.765	.744	.705
Intercept	37.66	25.56	13.33	2.61	-4.68	-7.12
Slope	.00039	.00051	.00064	.00076	.00085	.0089
Student	2.46	1.46	.66	.11	-.17	-.23
SSQ Last 5 Residuals	5.13	5.66	6.23	6.71	6.99	7.08

Table 25b. Calibration results using survey 6-11 numbers vs SPA 6-11 population numbers (1970-1986).

	Terminal F					
	.25	.30	.35	.40	.45	.50
R	.823	.834	.841	.842	.838	.829
Intercept	228.61	84.08	-44.78	-153.99	-241.44	-306.81
Slope	.081	.099	.115	.129	.141	.151
Student	.914	.323	-.165	-.538	-.796	-.951
SSQ Last 5 Residuals	7.59	7.83	7.93	7.93	7.90	7.91

Table 26. Catch at age in 1986 and projected to 1987-88 under 2 options.

A) F = .375 for 1987 and $F_{0.1}$ = .28 for 1988.

Age	1986	1987	1988
2	60	65	48
3	1291	2605	2120
4	6019	1912	2956
5	4453	5442	1340
6	5234	3023	2881
7	4510	2945	1326
8	494	2538	1292
9	139	278	1114
10	268	78	122
11	266	151	34
2+	22734	19036	13234
3+	22674	18972	13185
4+	21383	16367	11065
5+	15364	14455	8109

B) F = .375 for 1987 and 50% rule F = .35 for 1988.

Age	1986	1987	1988
2	60	65	60
3	1291	2605	2626
4	6019	1912	3624
5	4453	5442	1629
6	5234	3023	3487
7	4510	2945	1606
8	494	2538	1564
9	139	278	1348
10	268	78	148
11	266	151	42
2+	22734	19036	16135
3+	22674	18972	16074
4+	21383	16367	13448
5+	15364	14455	9824

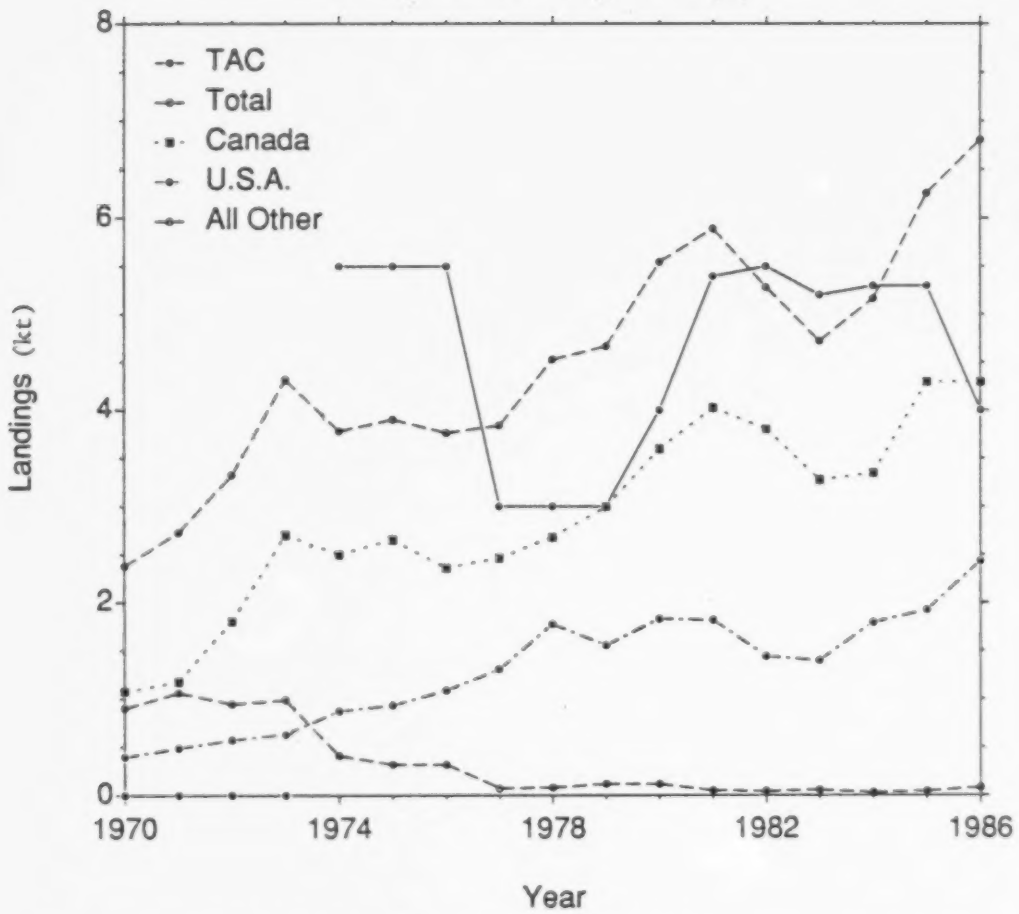


Figure 1. Nominal catch (kt) of NAFO Divisions 4VW + SA 5 pollock during 1970-1986.

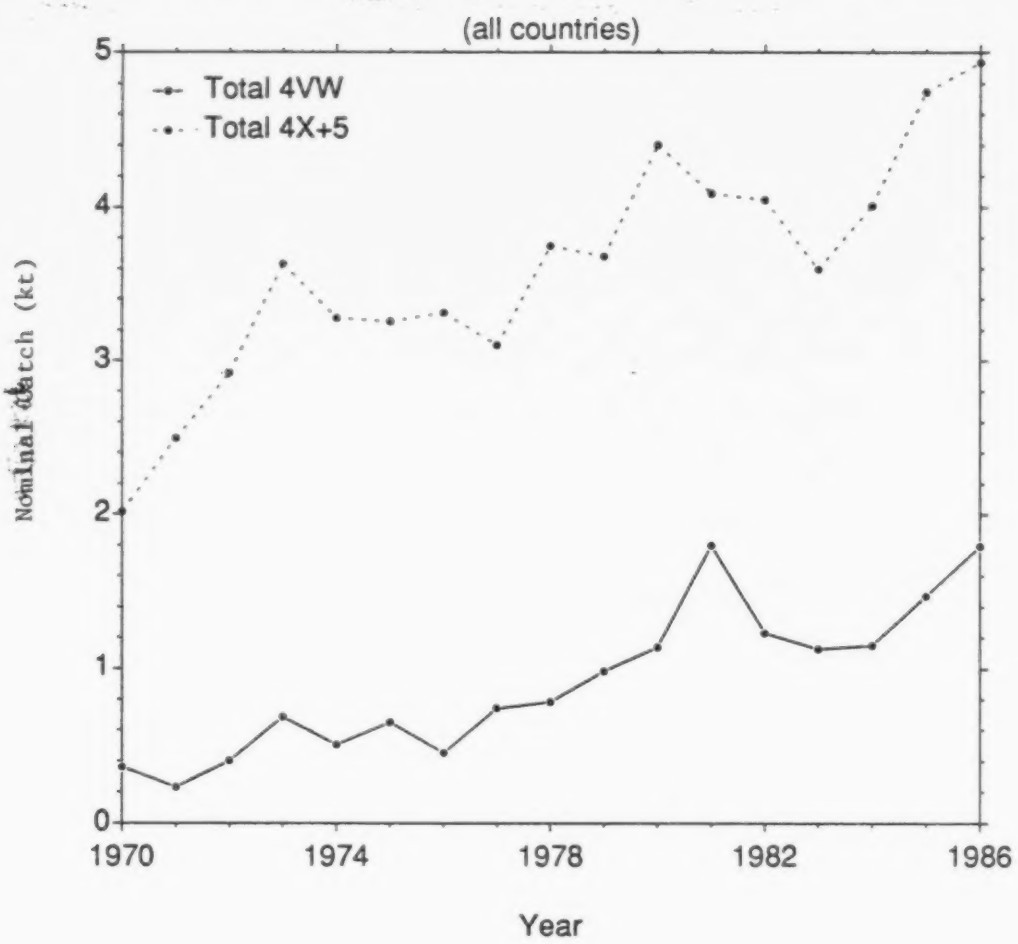


Figure 2. Nominal catch of 4VW and 4X + 5 pollock (1970-1986).

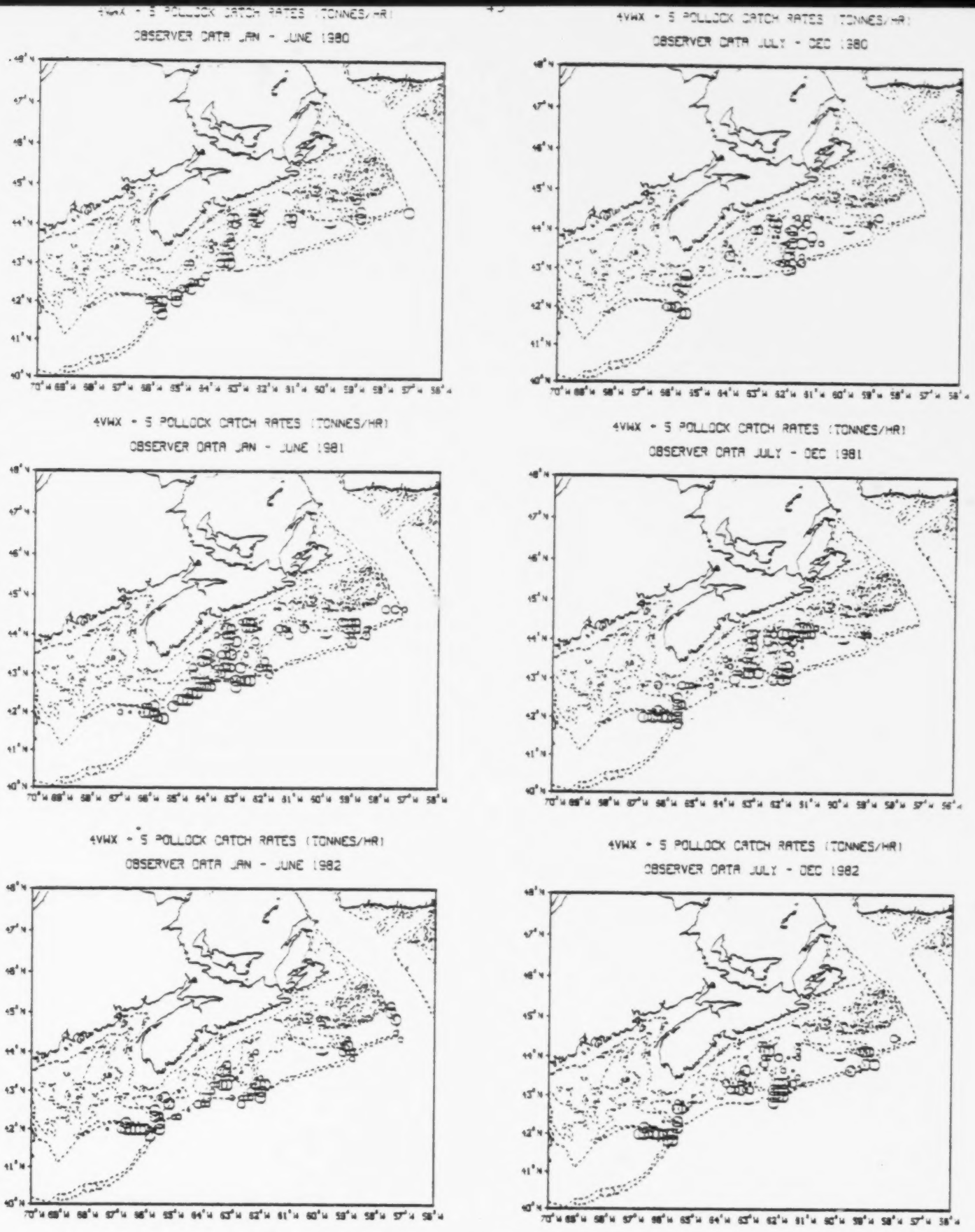
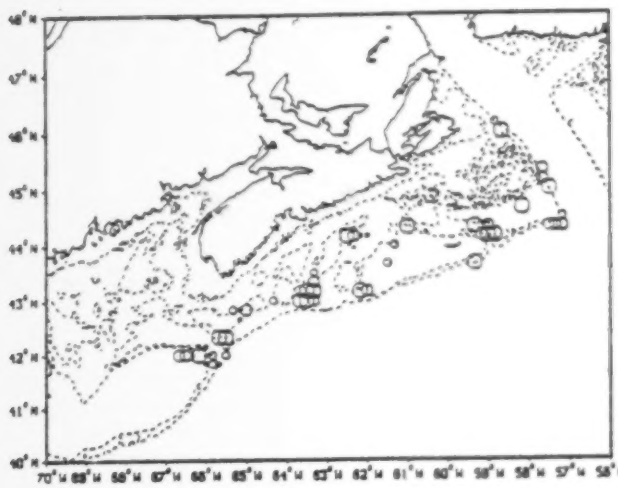

4VWX + 5 POLLOCK CATCH RATES (TONNES/HR)
OBSERVER DATA JAN - JUNE 1980
4VWX + 5 POLLOCK CATCH RATES (TONNES/HR)
OBSERVER DATA JULY - DEC 1980
4VWX + 5 POLLOCK CATCH RATES (TONNES/HR)
OBSERVER DATA JAN - JUNE 1981
4VWX + 5 POLLOCK CATCH RATES (TONNES/HR)
OBSERVER DATA JULY - DEC 1981
4VWX + 5 POLLOCK CATCH RATES (TONNES/HR)
OBSERVER DATA JAN - JUNE 1982
4VWX + 5 POLLOCK CATCH RATES (TONNES/HR)
OBSERVER DATA JULY - DEC 1982
LEGEND
• LESS THAN .2 ⊙ .2 TO .7 ○ .7 TO 1.7 ○ MORE THAN 1.7

Figure 3. International Observer plots of catch rates for pollock (Jan.-June; July-Dec.; 1980-1986).

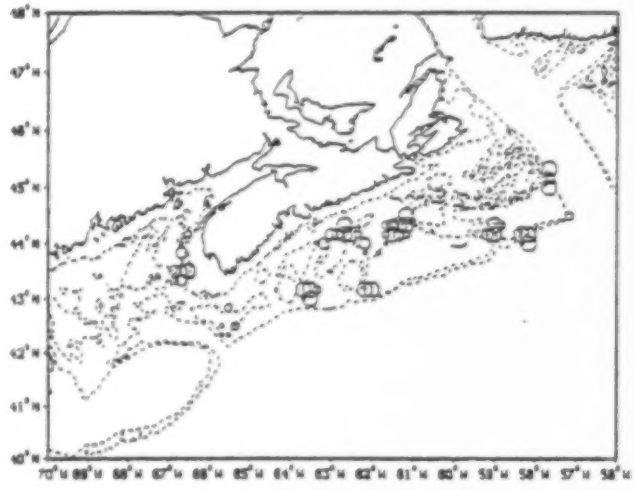
4VWX + 5 POLLOCK CATCH RATES (TONNES/HR)
OBSERVER DATA JAN - JUNE 1983



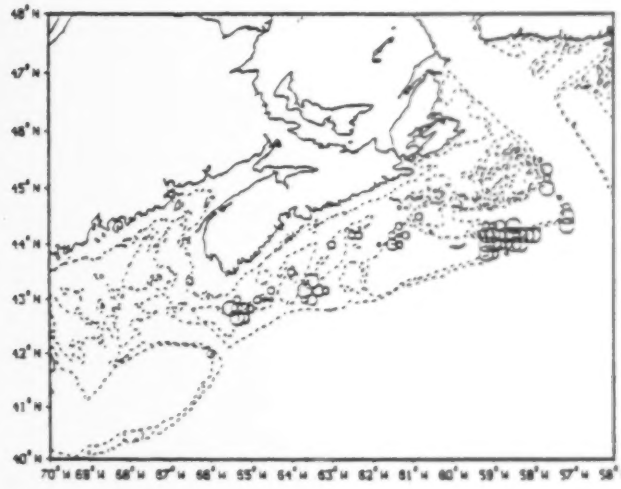
4VWX + 5 POLLOCK CATCH RATES (TONNES/HR)
OBSERVER DATA JULY - DEC 1983

4VWX + 5 POLLOCK CATCH RATES (TONNES/HR)
OBSERVER DATA JAN - JUNE 1984

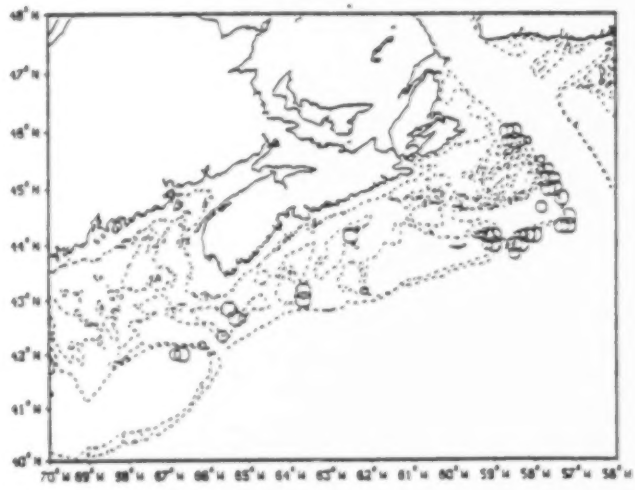
4VWX + 5 POLLOCK CATCH RATES (TONNES/HR)
OBSERVER DATA JULY - DEC 1984



4VWX + 5 POLLOCK CATCH RATES (TONNES/HR)
OBSERVER DATA JAN - JUNE 1985



4VWX + 5 POLLOCK CATCH RATES (TONNES/HR)
OBSERVER DATA JULY - DEC 1985



LEGEND
• LESS THAN .2 ⊙ .2 TO .7 ○ .7 TO 1.7 ○ MORE THAN 1.7

Figure 3. (Continued).

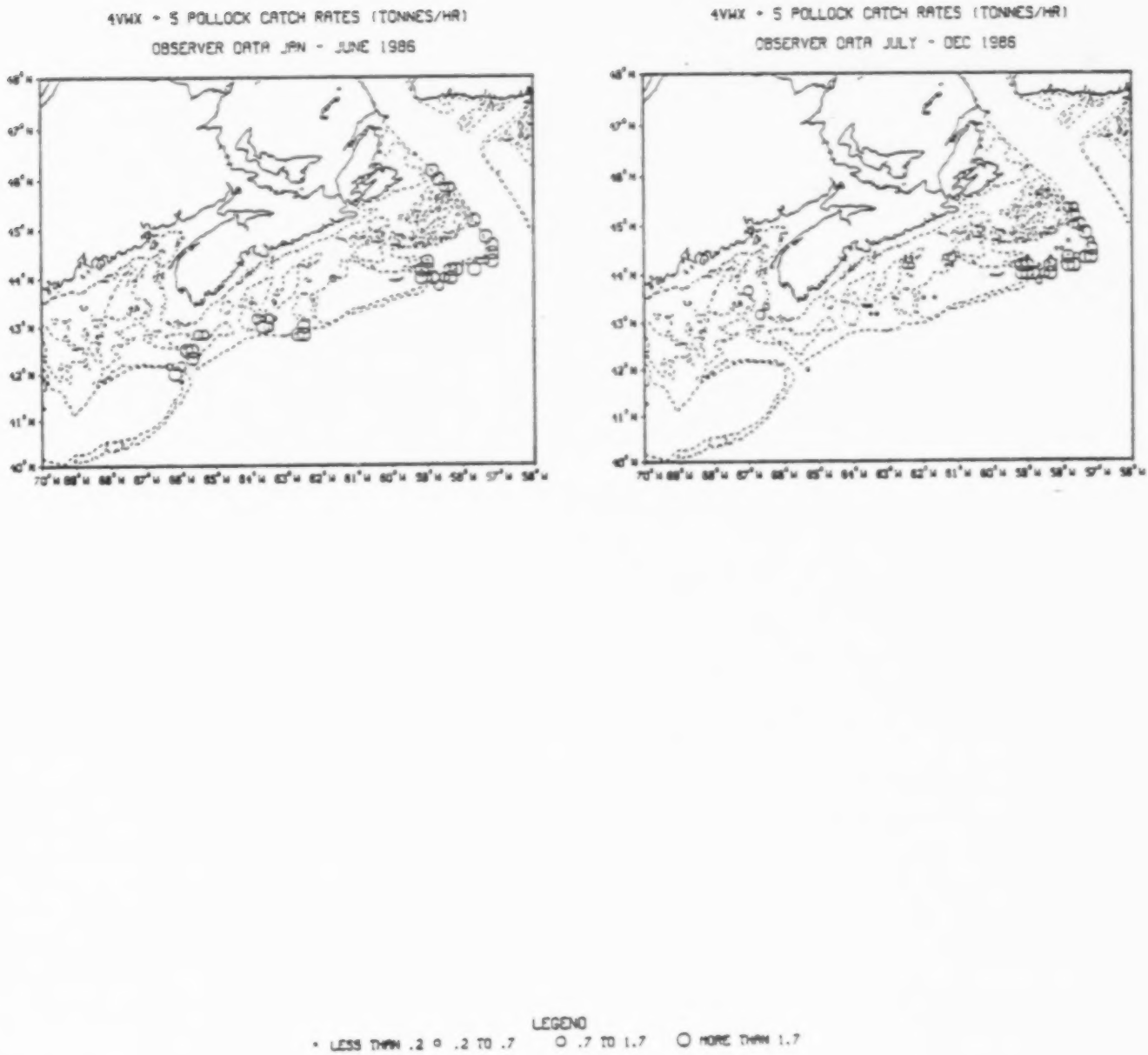

4VWX + 5 POLLOCK CATCH RATES (TONNES/HR)
OBSERVER DATA JAN - JUNE 1986
4VWX + 5 POLLOCK CATCH RATES (TONNES/HR)
OBSERVER DATA JULY - DEC 1986
LEGEND
• LESS THAN .2 ⊙ .2 TO .7 ○ .7 TO 1.7 ○ MORE THAN 1.7

Figure 3. (Continued).

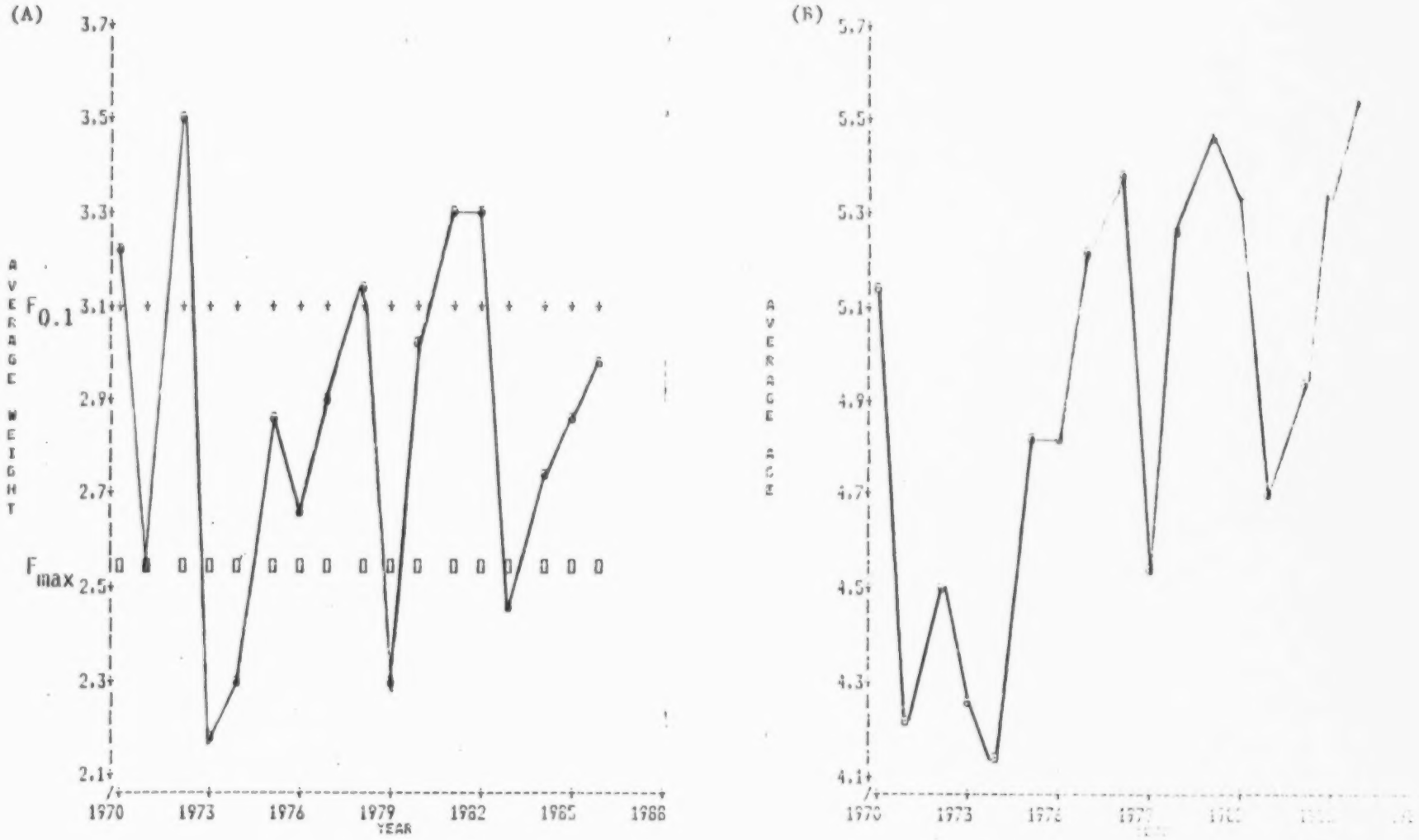


Figure 4. Average weight (A) and age (B) of pollock in the catch over time.

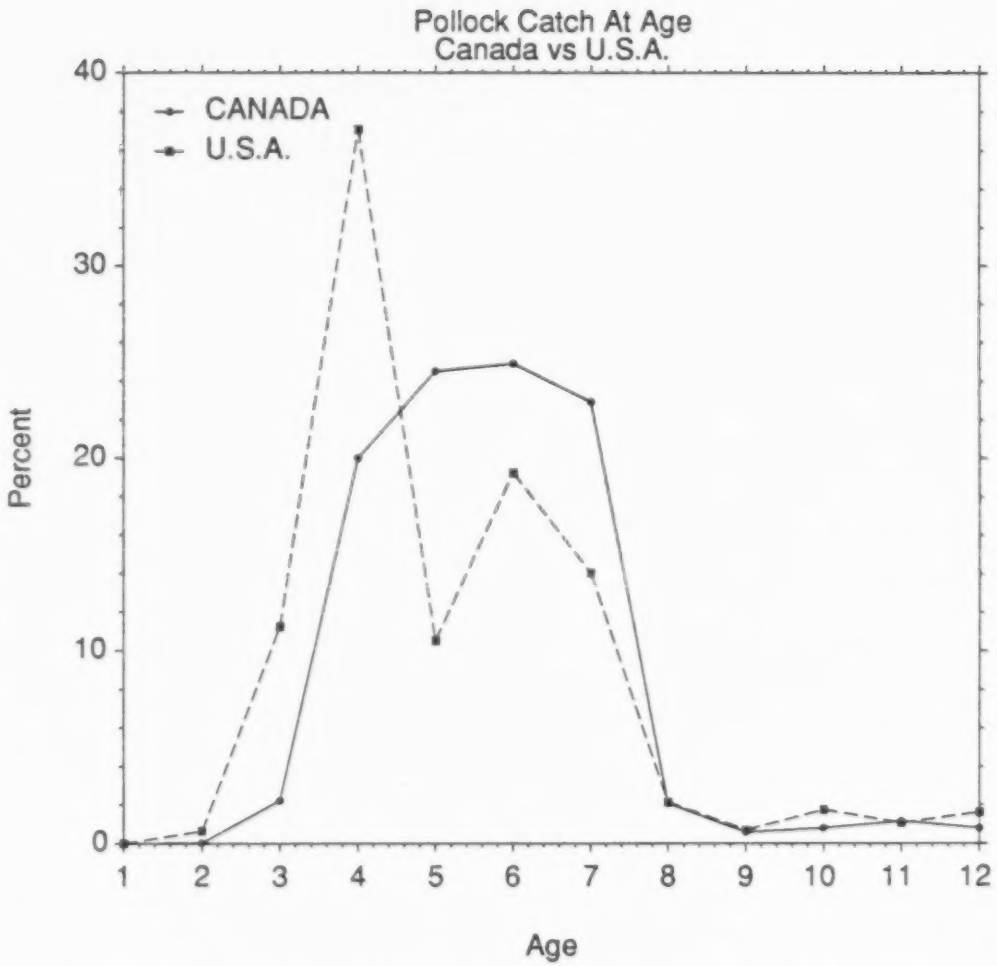


Figure 5. Percent catch-at-age 1986, for Canada and the USA.

Figure 6. Commercial catch rate series Jun-Aug Pollock=MSP

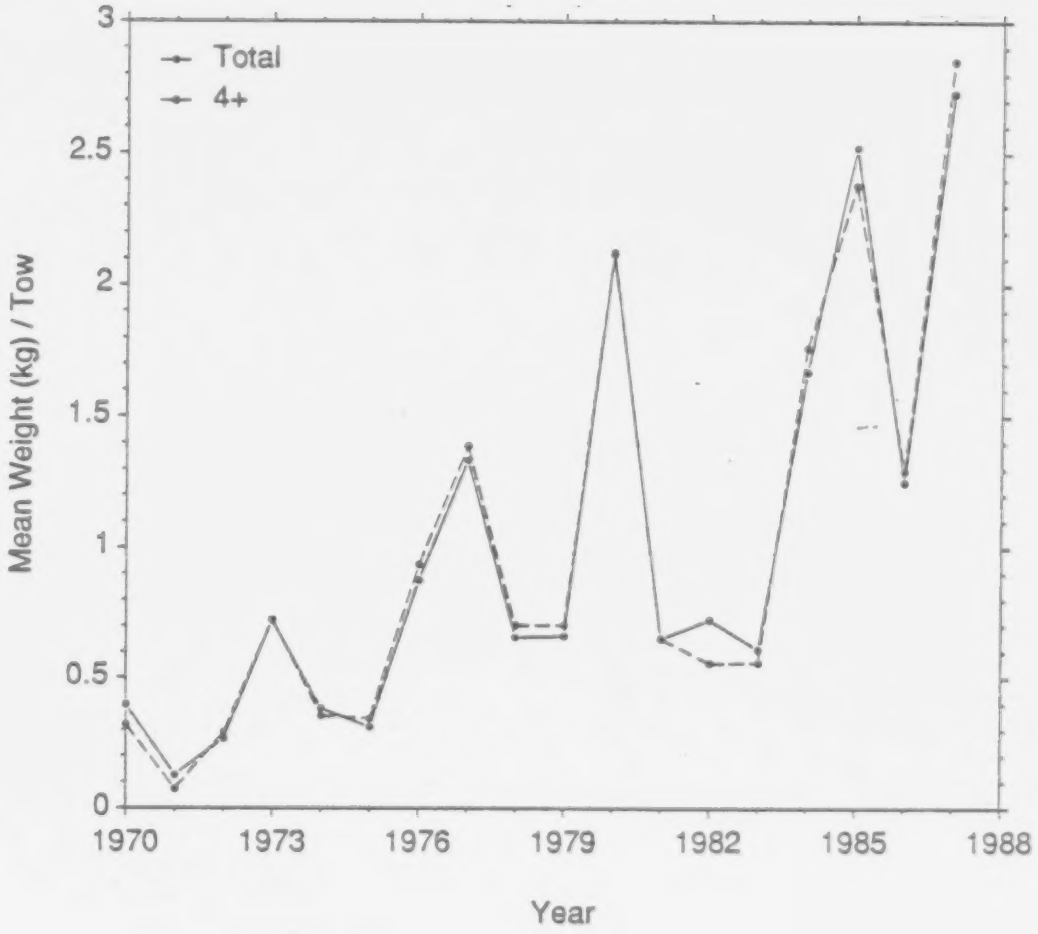


Figure 7a. Canadian survey weight per tow -- standardized to the mean.

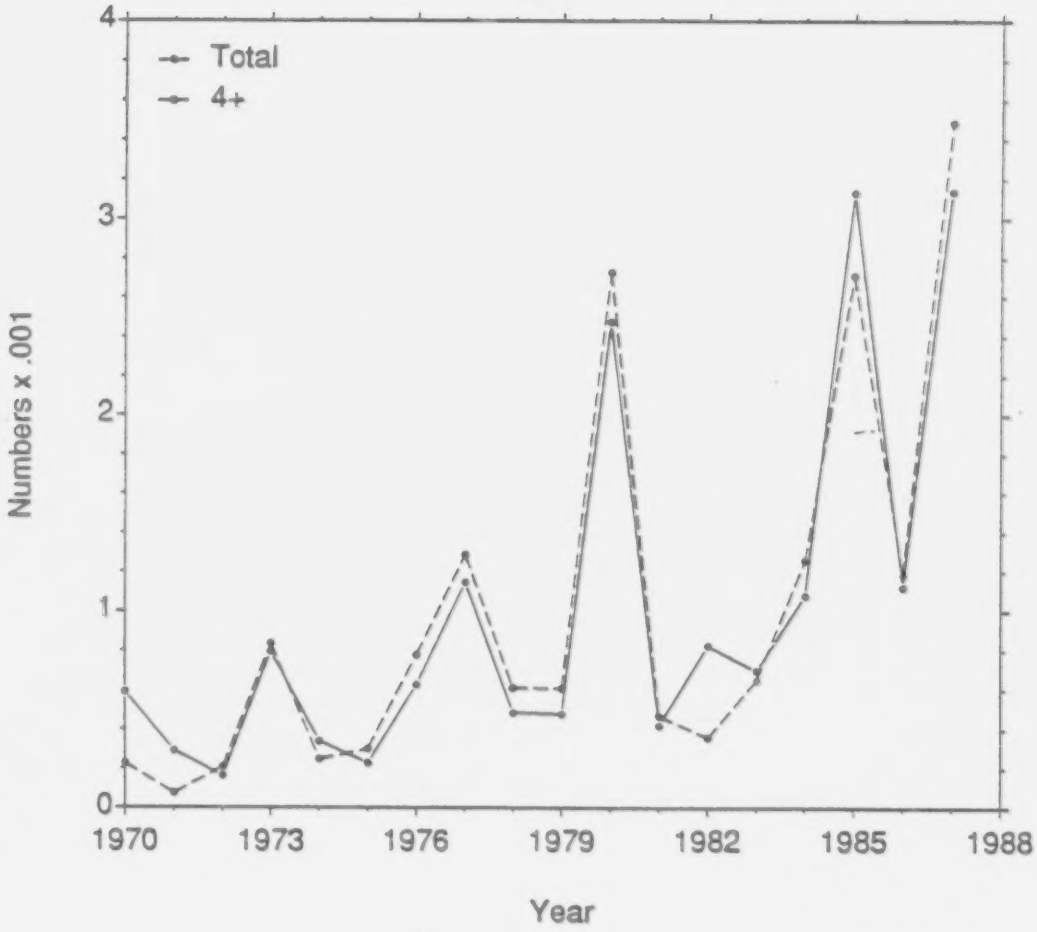


Figure 7b. Canadian survey numbers per tow — standardized to the mean.

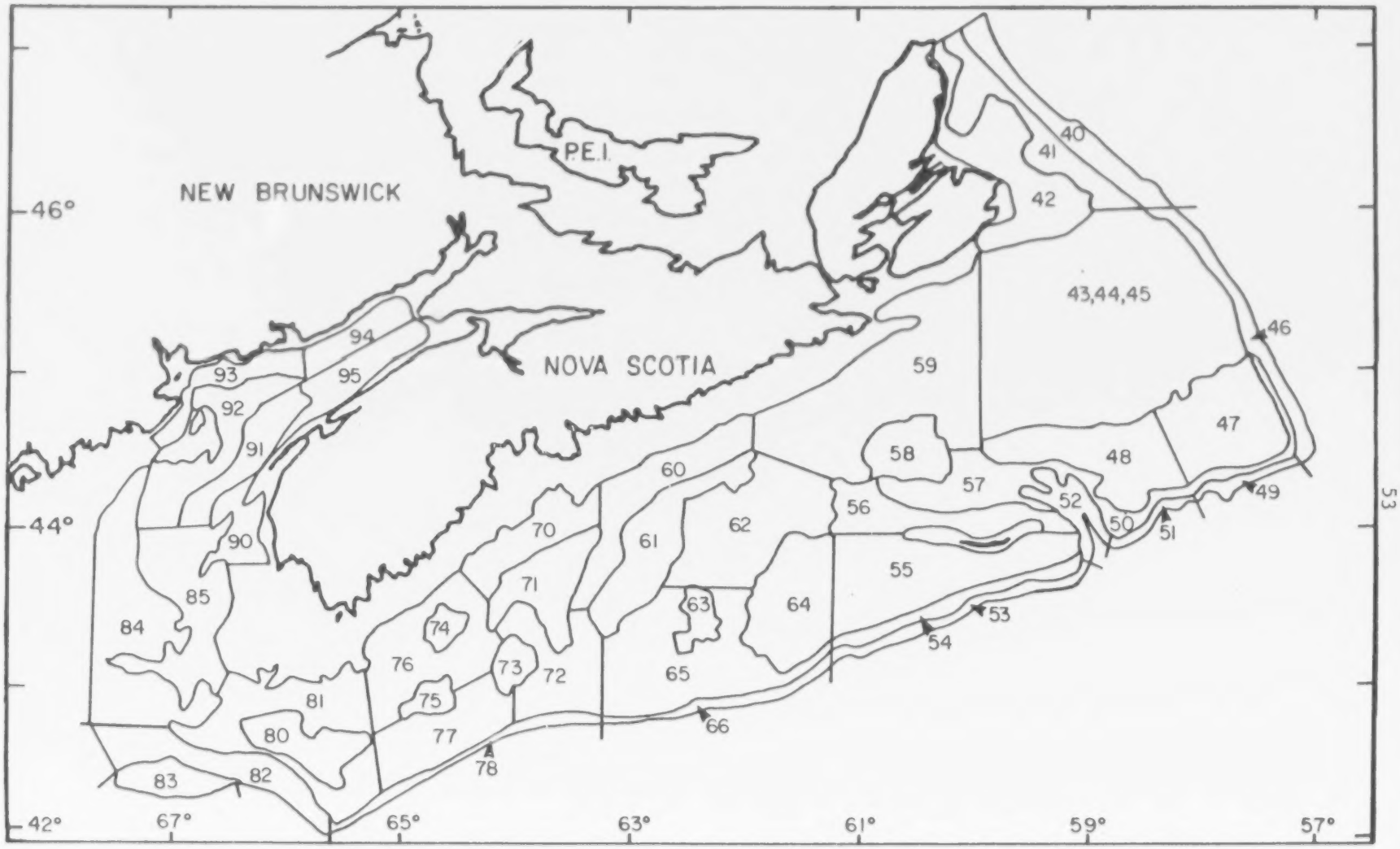


Figure 8. STRAP map of Scotian Shelf (Divisions 4VW + Subarea 5).

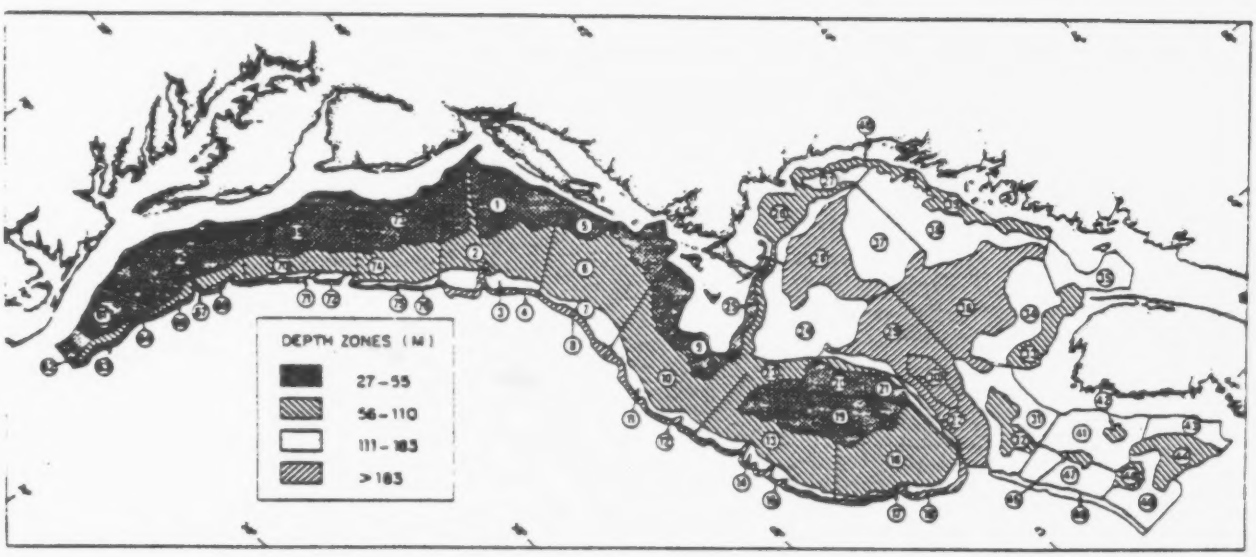


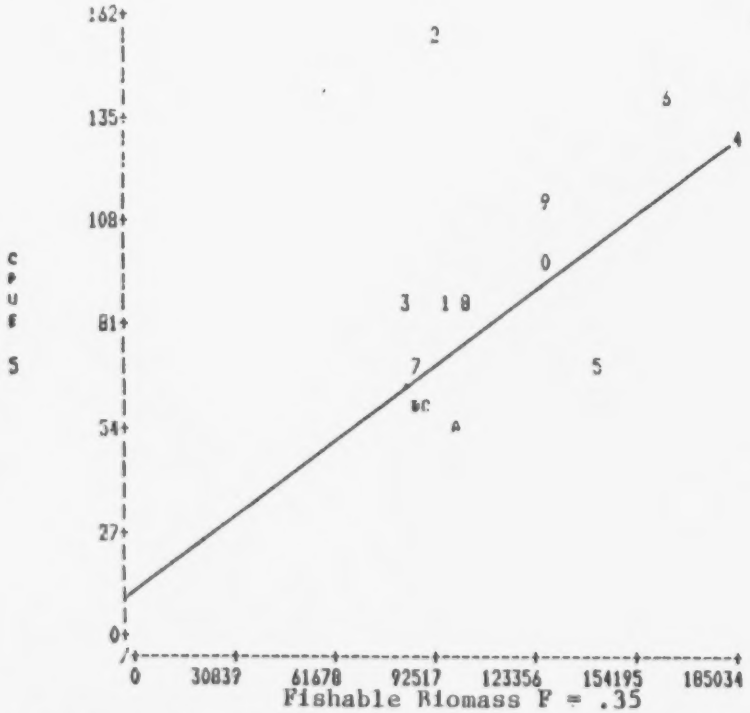
Figure 9. Stratification used for USA bottom trawl surveys.

RESULTS OF REGRESSION

Y= 13.33467561+ 0.0006418239416 X

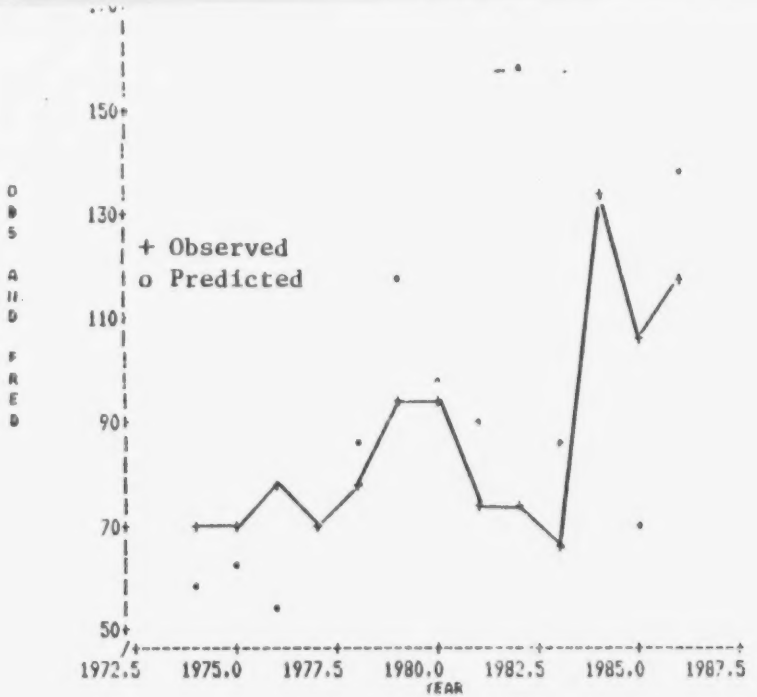
R2= 0.5933483216 R= 0.7702910629

STUDENT T FOR INTERCEPT= 0.6624124216



S	YEAR	RESIDUALS	IND	DEP
C	1974	-0.659	88779	58
B	1975	-0.449	87353	61
A	1976	-1.293	97904	52
7	1977	0.027	85936	89
8	1978	0.293	101578	84
9	1979	1.166	126004	116
0	1980	0.116	126992	97
1	1981	0.747	96147	89
2	1982	1.000	92995	158
3	1983	1.067	93708	87
4	1984	-0.219	185032	128
5	1985	-1.841	141909	70
6	1986	1.047	163748	138

SQR (ABS S RES STAND 6.231313837



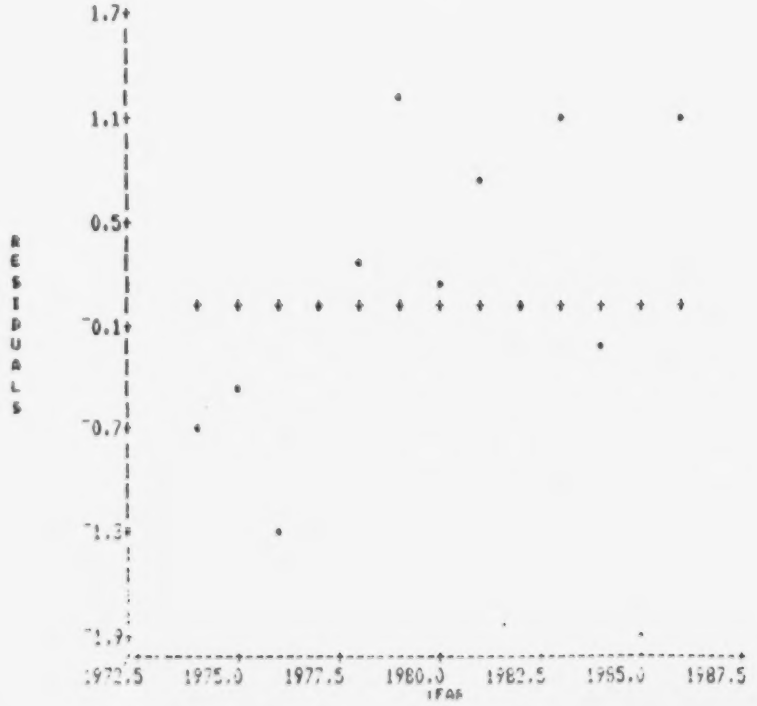
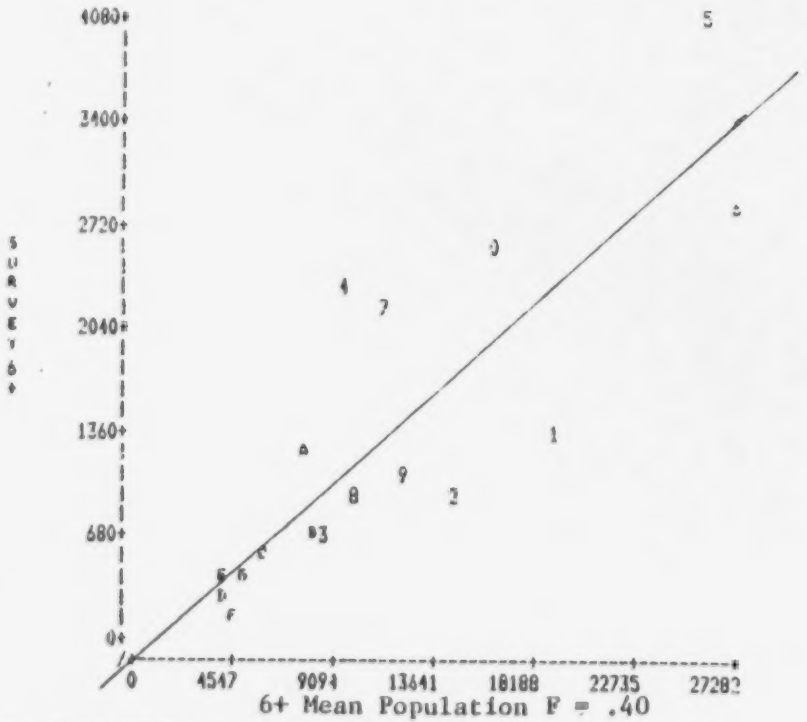
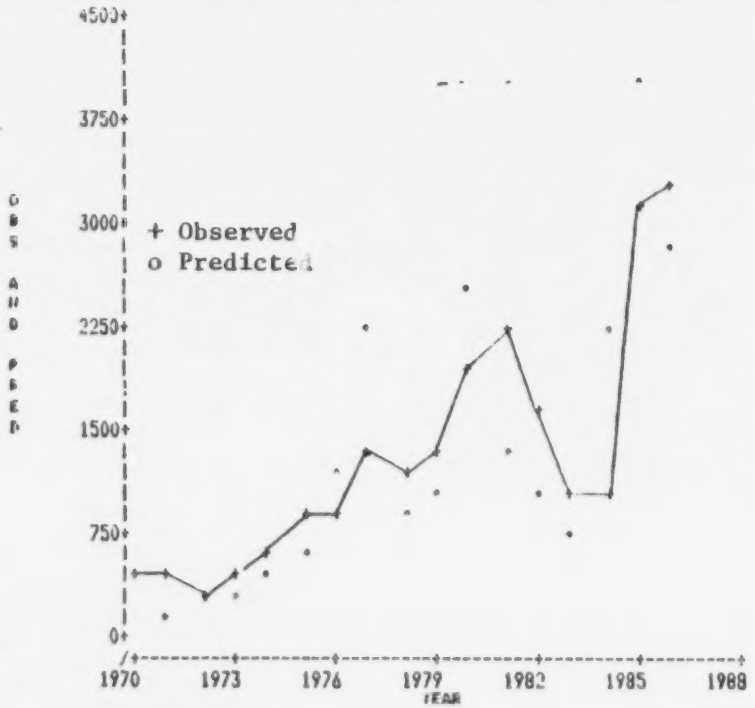


Figure 10. Calibration plots for pollock OTB 2 TC 5 (June-Aug.) catch rates vs fishable biomass with annually calculated PR (1974-86 excluding 1982).



6	YEAR	RESIDUALS	IND	DEP
G	1970	-0.046	4935	455
F	1971	-0.597	4692	86
E	1972	-0.019	3992	350
D	1973	-0.167	4121	276
C	1974	-0.110	5764	523
B	1975	-0.415	7959	620
A	1976	0.579	7890	1220
7	1977	1.547	11194	2240
8	1978	-0.405	10041	895
9	1979	-0.562	12067	1060
0	1980	0.875	16554	2520
1	1981	-1.589	19027	1330
2	1982	-1.142	14485	1017
3	1983	-0.466	9838	702
4	1984	1.908	9641	2260
5	1985	1.481	25945	4060
6	1986	-0.831	27277	2860

SSQ LAST 5 AGE STAND 7.928742795



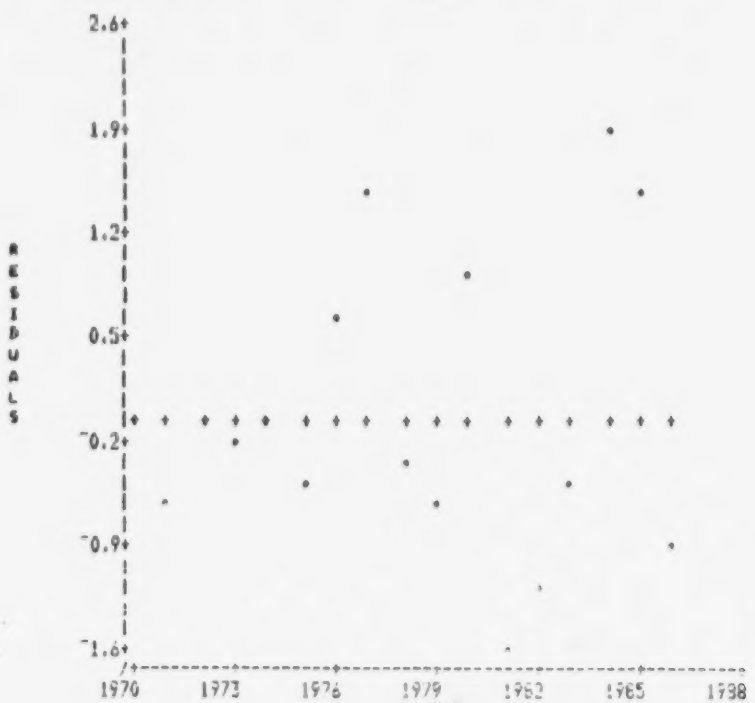


Figure 11. Calibration plots for pollock 4VWX5 survey 6-11